United States Marine Corps

Radio Frequency Identification (RFID)
Implementation Plan

Headquarters, United States Marine Corps
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Attn: LPD
2 Navy Annex
Washington, DC 20380-1775

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From: Headquarters Marine Corps (Code LPD)
To: Distribution

Subj: CHANGE TO RFID IMPLEMENTATION PLAN

1. The Marine Corps RFID Implementation Plan was originally dated 10 November 2005 and later updated on 13 February 2006. As published, it is anticipated it will require periodic updates – a revised paragraph is provided below for insertion based upon a GAO audit of tag management and reuse. The changed paragraphs are:

3.8.1. The active RFID tag is a reusable commodity. Units receiving shipments with RFID tags must make it a practice to recover and re-use the active RFID tags as part of subsequent shipments or retrograde shipments.

3.8.2. Once a tagged item reaches its final destination, the receiving organization is responsible for recovery and re-use of the Active RFID tag. The tag data shall be erased and the battery reversed.

3.8.3. Should a unit exceed their requirement of RFID tags, excess will be reported to higher headquarters for disposition /re-distribution instructions. If MEFs and/or MARFORs determine they are excess, they will contact the Marine Corps Systems Command AIT office within Product Group 10 (PG-10) to receive disposition and/or redistribution instructions. If directed to send to DLA, Marine Forces Command and Marine Reserve Forces will return tags to Susquehanna, PA and Marine Forces Pacific Commands will return tags to San Joaquin, CA.

The addresses are:

Distribution Depot Susquehanna, PA
Attn: DDSP-OMP
Warehousing Branch
Building 203 Door 12
Mechanicsburg, PA 17055-0789

Distribution Depot San Joaquin, CA
Transportation Office
DDJC-TA
Warehouse 30
25600 S. Chrisman Rd
Tracy, CA 95376-5000

2. Questions associated with this change should be addressed to Mr. Ricky Morton (ricky.morton@usmc.mil) or Mr. Erick Lermo (erick.lermo.ctr@usmc.mil) – both at phone number (703) 695-7930.

Distribution: A

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EXECUTIVE SUMMARY

In a 30 July 2004 Policy Memorandum, the Deputy Under Secretary of Defense for Logistics and Materiel Readiness (DUSD (LM&R)) required each service to develop an Implementation Plan for the use of Active and Passive RFID technologies in logistics business processes.

The objective of this document is to meet the guidance provided by the DUSD (LM&R) as well as provide background and guidance to the Marine Corps enterprise in the implementation of the technology.

Active RFID's implementation is largely completed. Chapter 3 of this document focuses primarily on procedures associated with the operation of the associated equipment, Active RFID tagging requirements, recovery and return, etc.

The implementation of Passive RFID will be conducted in conjunction with four pilots, each building upon one another and fully testing the technology's capabilities. The pilots will be initiated in relatively static organizations to minimize the burden on operational forces. As success in the pilots is achieved, fielding in like organizations will be conducted and ultimately RFID will be fielded to deployed units. Our mitigation strategy will examine the pilot's effectiveness, which will allow for adjustments and changes.

The pilot schedules and goals are as follows: The **first pilot** will be conducted at MARCORLOGCOM during FY 2008 to test the capability of the technology, in a static environment, to provide read rates and the means to transfer data among wholesale-level systems. It will also be a tool for determining the overall cost of implementation. **A second pilot** will be conducted at a Supply Management Unit (SMU) during FY 2009 that will evaluate RFID technology in-conjunction with future logistics processes and Global Combat Support System-Marine Corps (GCSS-MC) implementation. The **third pilot** in FY 2010 will be conducted at a Traffic Management Office (TMO) and determine the feasibility of receiving Advance Shipping Notices (856 transactions) through Automated Manifest System-Tactical (AMS-TAC) and passing the information to a SMU. The **fourth pilot** conducted during FY 2011 will test deployed capabilities of RFID in support of the Marine Corps logistics operations in austere operational environments – focusing on the use of hand-held portable devices and other portable RFID equipment.

In conjunction with the pilots, a POA&M and detailed funding profile are provided as appendices. Although dynamic, these baseline our planned expenditures and provide a level from which to adjust.

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REFERENCES

(a) CMC Washington DC message date time group 1241918Z Nov 04 Guidance For Supporting Radio Frequency Identification (RFID) Equipment Installed on Marine Corps Facilities
(b) CMC Washington DC message date time group 121529Z OCT 04 USMC POC for Automatic Identification Technology (AIT)
(c) DOD Logistics Transformation Strategy (Draft), Achieving Knowledge-Enabled Logistics, 10 Sep 04
(d) DOD Suppliers' Passive RFID Information Guide, Update 31 Aug 04
(e) USD (AT&L) Memo of 30 Jul 2004, Subj: Radio Frequency Identification (RFID) Policy
(f) DoD Concept of Operations (CONOPS), Radio Frequency Identification (RFID), version 1.0, dated 8 Jun 04
(g) USD (Comptroller) Memo of 12 Aug 03, Subj: Funding for Radio Frequency Identification
(h) OSD Policy Letter, Funding for Radio Frequency Identification (RFID) Equipment, dated 2 August 2003
(i) RFID II Contract DABL01-03-D-1002, 21 Jan 03
(j) Joint Distribution Total Asset Visibility (JDTAV) RFID Data Format 2.0 of May 2002
(k) DOD ITV Integration Plan, Mar 00
(l) DOD Publication 4500.9-R, Defense Transportation Regulation (Part I – Passenger Movement, Sep 00; Part II - Cargo Movement, May 03; Part III – Mobility Nov 01; Part IV – Personal Property Aug 99)
(m) Field Manual (FM) 100-17-3, Reception Staging, Onward Movement and Integration, Mar 99
(n) Joint Total Asset Visibility (JTAV) Strategic Plan, Jan 99
(o) DOD Directive 5200.28, Security Requirements for Automated Information Systems (AIS's), Mar 88

CHAPTER 1

INTRODUCTION

1.1 Purpose

The purpose of this document is to provide a single source of guidance for Marine Corps strategic implementation planning for the use of Radio Frequency Identification (RFID) Technology, as mandated by the Office of the Secretary of Defense (OSD). This will enable improved visibility in logistics operations and distribution management in support of the DoD RFID Policy dated 30 July 2004. The Marine Corps is integrating AIT into logistics business processes to facilitate the collection of initial source data, reduce processing times, improve accuracy, and enhance asset visibility. This plan, *U.S. Marine Corps Radio Frequency Identification Implementation Plan (short title: RFID Implementation Plan),* is a living document, providing overarching guidance and direction for implementing AIT (specifically RFID) in logistics business processes. It addresses RFID used by the Marine Corps to support logistics operations as well. Additionally, it assigns responsibility for key implementation actions.

1.2. Scope

1.2.1. The Marine Corps RFID Implementation Plan provides guidance and procedures for the use of data rich active RFID and electronic product code (EPC) compliant passive RFID technology in Marine Corps logistics and distribution processes. It meets the DoD RFID policy requirements for CONOPS and implementation procedures for active RFID and also meets the DoD RFID policy requirements for CONOPS and strategic implementation plans for integration of EPC passive RFID as that technology matures and emerges. Integration of active and passive RFID in logistics enterprise will require analysis of business processes at the national, installation and tactical levels. Incremental integration of RFID into the logistics enterprise business processes will be accomplished as resources and schedule permits.

1.2.2. RFID is part of the larger suite of AIT. The Marine Corps will continue to leverage the AIT suite of tools and devices to ensure best value is attained in each business process. The integration of RFID into the business processes enables the implementation of 'sense and respond' logistics.

1.2.3. The objective is to leverage both passive and active RFID to modernize logistics practices, reduce unnecessary reliance on human intervention for routine tasks, increase data collection accuracy and timeliness at the source of an actionable event, and increase productivity. In general, data rich active RFID will continue to be used to provide inside-the-box in-transit visibility (ITV) nodal tracking within the distribution system. EPC passive RFID will be used where it will improve the Marine Corps' future logistics processes. It will initially be leveraged to enhance asset visibility at the case and pallet level and subsequently to the item level, in support of supply chain inventory and accountability at motion and rest. The integration of EPC passive and data rich active RFID is a logistics imperative to achieving a fully integrated

enterprise solution. The future of Marine Corps logistics will include a combined solution using active and EPC passive RFID technologies.

1.2.4. To achieve these goals the Marine Corps will perform the following **xx** tasks.

1.2.4.1. Analysis of future IT systems must be conducted, to the greatest extent possible, to determine those areas where gaps in ITV may be present. Where gaps exist a determination will be made regarding the utility of placing RFID technology to fill the space.

1.2.4.2. A series of pilot will be developed to ensure full system deployability to the operating forces. The pilots, further discussed in chapter 4, involve the development of business rules, and will provide the means to evaluate the system capabilities and validate the integration of RFID technology with the logistics Operational Architecture (OA) and Global Combat Support System-Marine Corps (GCSS-MC).

1.2.4.3. Training plans consistent with the individual pilot's goals will be developed and provided to Marines to ensure they have a firm understanding of the RFID equipment capabilities, limitations and the need to integrate with both processes and GCSS-MC.

1.2.4.4. Consistent with the pilots and implementation efforts, funding will be budgeted for and identified to purchase hardware, software, installation and instruction.

1.2.4.5. As the pilots are being conducted progress and final reporting will be provided to Headquarters Marine Corps (I&L) and to MARCORSYSCOM (PGD-10) . this will provide the means in which adjustment may be made to the pilots in progress and determinations whether or not to pursue specific technologies in various locations within the logistics chain.

1.3 Background

1.3.1. Operation Desert Shield/Storm (DS/DS) highlighted the need to gain visibility of the contents of a container ("inside the box") visibility. Nearly 80,000 containers were shipped to the theater without content level visibility. Nearly half of the containers shipped in support of DS/DS were not opened until after being retrograded. The cost of not having adequate visibility had many significant impacts on readiness and resources during and after the operation..

1.3.2. Radio Frequency Identification (RFID) technologies are part of the suite of AIT that enables accurate and timely automatic capture of actionable logistics data with little reliance on human intervention. There are two distinct families of RF capabilities being used in actionable logistics functions; active RFID and passive RFID. Although this plan focuses on the use of RF technologies to improve efficiency in future supply chain operations, employing any and all AIT tools and devices in an integrated strategy to improve all logistics processes is the ultimate goal.

1.3.3. AIT

1.3.3.1. The DoD and commercial supply chains have been using AIT for many years. AIT is a suite of enabling tools and devices that are used to automate the capture,

recording, reporting, aggregation, or collection of data directly at the source of the data and feed it into an automation information system (AIS). The suite of tools consists of such media as linear and 2 dimensional barcodes, contact memory buttons (CMB), common access cards (CAC), biometrics, optical memory cards (OMC), satellite tags and tracking systems, and passive and active RF tags and readers.

1.3.3.2. A good way to understand AIT is envision all the ways that data can be input to or output from an automated system without the use of a keyboard. AIT is strictly an enhancement to an automated information system (AIS); thereby the media is agnostic and can be applied through simple interfaces. AIT tools also include fixed and mobile architecture hardware, handheld readers and scanners, specialized printers, cameras, sensors, and tags.

1.3.4. DoD Guidance. The Deputy Under Secretary of Defense for Acquisition, Technology and Logistics published a Policy Memorandum dated July 30, 2004, directing DoD components to immediately resource and implement the use of high data capacity Active RFID in the DoD operational environment. Additionally, it states that DoD will be an early adopter of Passive RFID technology.

1.3.5 Marine Corps Guidance

This implementation plan supports the *United States Marine Corps Logistics Campaign* Plan.[1] The capabilities of RFID supports the requirements of the campaign plan, as shown in the plan extract in Figure 1-1.

1.3.1	Develop and field Automatic Identification Technology and Total Asset Visibility capabilities to support the identification and processing of materiel within the storage and distribution process
1.3.2.	Develop and implement a methodology to develop an effective, responsive, and seamless distribution system extending from source of supply through the theater distribution system or Navy fleet logistics channels, into and including forward deployed MAGTFs.
1.3.3.	Achieve 100% automated visibility, access and redistribution of all classes of supply.
1.3.4.	Reduce retail Customer Wait Time (CWT) to no more than 24 hours.
1.3.5.	Reduce CWT to no more than five days.

Figure 1-1 AIT Integration Supports the Logistics Campaign Plan

Regarding Active RFID, the capability gained is through an improvement in in-transit visibility – this is gained through visibility into information provided by the ITV server. Users may log directly into the ITV server or pull information from programs such as Joint Total Asset Visibility (JTAV), Global Transportation Network (GTN), Warehouse to Warfighter (W2W), and Battle Command Sustainment Support System (BCS3). Passive RFID may support processes

[1] United States Marine Corps, Deputy Commandant for Installations and Logistics, *United States Marine Corps Logistics Campaign Plan*, 2002

associated with receipting for materiel, improved storage and distribution and likely reduce customer wait time.

CMC message 121529Z Oct 04, USMC POC FOR AUTOMATIC IDENTIFICATION TECHNOLOGY, establishes Service points of contact for AIT (RFID). Paragraph 3 of the message is copied into figure 1-2:

> 3. Within HQMC, Code LPD is the responsible office for coordinating all aspects of RFID supporting a focused TAV and ITV. This includes:
>
> A. Being the primary POC for Service-wide AIT policy, procedures, instrumentation, and implementation in support of the MARFORS and supporting establishment.
> B. Lead and support for Service AIT issues to external agencies such as OSD and the Joint Staff.
> C. Coordination of AIT pilots, testing, and evaluation with all functional advocates to ensure full AIT integration across the business enterprise.
> D. Coordination of those AIT business processes outside the functional lines (i.e. installation of RFID at a Base/Station) to include long-term maintenance.
> E. Development and review of architectural requirements for future AIS under GCSS-MC, which includes Log C2.
> F. Coordination with TECOM for AIT insertion into MOS training packages.

Figure 1-2

1.3.6 Vision. With minimal human intervention or affect on business processes, Logistics AIT in the Marine Corps will achieve an environment in which accurate and timely logistics data are automatically passed to information systems to achieve total asset visibility throughout the combat support process—from origin to destination and back.

1.4. Goals and Objectives

1.4.1. To achieve functional process improvements that significantly enhance end to end logistics chain visibility; automated receipt processing, and overall inventory management throughout processes at all levels.

1.4.2. To create a fully integrated modernized distribution system capable of providing focused logistics support to modular forces operating in austere environments.

1.4.3. To facilitate actionable CSS C2 to logistics and operational decision makers to initiate and sustain warfighting.

1.4.4. Continue to examine and identify means to implement AIT technologies that will assist in streamlining logistics processes.

1.4.5. Implement the DoD RFID Policy.

1.4.6. Identify and pursue RFID implementations that add value to logistics processes.

1.4.7. Integrate AIT into all applicable logistics processes and related AISs.

1.4.8. Create and sustain a system to measure the progress of AIT implementation in achieving their objectives

1.5. External Initiatives Affecting RFID

1.5.1. General.

1.5.1.1. Several other initiatives are underway within DoD and the Marine Corps that will influence the implementation of RFID technology. The Marine Corps, in recent years established a new operational architecture for its future logistics processes and its associated logistics IT solution is Global Combat Service Support System – Marine Corps (GCSS-MC). All technologies must be compatible with these. Additionally, Unique Item Identification (UID), and Defense Logistics Management System (DLMS), may affect the implementation of RFID within the Marine Corps.

1.5.1.2. Initiatives outside DoD will influence the way RFID will be used within DoD. However, this document is focused primarily on RFID implementation and considers the impact of these other initiatives only as required to meet the objectives of this document.

1.5.2. Unique Item Identification (UID). In accordance with Reference A, Passive RFID tags will be placed on all case, pallet and item packaging for unique identification items.

1.5.3. Defense Logistics Management System (DLMS)

1.5.3.1. A recent Under Secretary of Defense memorandum directed the migration to the DLMS and the elimination of the Military Standard Systems (MILS) (also known as the Defense Logistics Standard Systems (DLSS)). This will require action to eliminate the generation and transmission of logistics transactions using the 80-character MILS formats.

1.5.3.2. It is widely believed that implementation of EPC Passive RFID will require the implementation of DLMS first. The guidance can be downloaded from the DLMS Office web site (http://www.dla.mil/j-6/dlmso/Programs/DLMS/migration.asp).

1.5.4. Electronic Product Code (EPC). The EPC is a unique number that correlates to a specific case, pallet or UID item. The EPC is stored on a passive RFID tag – as opposed to providing the equivalent of a stock-keeping unit (SKU) used in bar-coded inventory; the EPC provides a unique number for the individual item. The makeup of the EPC passive RFID tag is contained in the DoD RFID Policy Business Rules, Appendix D.

1.6. Strategic Requirements for RFID

1.6.1. The Marine Corps embraces the DoD belief that implementation of RFID is a strategic imperative necessary to streamline the supply chain to the war fighter. Data rich active RFID has enabled hands-free near real-time nodal visibility of commodities in transit to and from the CENTCOM AOR. The early adoption of EPC passive RFID is expected to further enable

hands-free processing of materiel and provide even greater enhancement to asset visibility by streamlining pick-pack-and-ship at origin and receipt processing at delivery.

1.6.2. The DoD Logistics Transformation Strategy calls for DoD to continuously assess the best practices and evaluate new concepts similar to large leading-edge commercial entities. Among the concepts considered are:

1.6.2.1. Focused Logistics – the ability to provide the right personnel, equipment, supplies, and support in the right place, at the right time and in the right quantities, across the full spectrum of military operations. Focused logistics envisions a fully enabled distribution system that flows efficiently in both directions.

1.6.2.2. Force-Centric Logistics Enterprise – this is DoD's mid-term vision to accelerate logistics improvements, enhance support to the war fighter, align logistics processes with the operational demands. A tenant of the force-centric logistics enterprise is end-to-end distribution.

1.6.2.3. Sense and Respond Logistics – is a network-centric, knowledge-driven, knowledge-guided concept that sustains force capabilities packages to assure Joint and Coalition effects-based operations and to provide precise, adaptable, agile support for the Commanders intent. A major tenant of Sense and Respond Logistics is point-of-effect to source-of-supply.

1.6.2.4. The DoD Logistics Transformation Strategy includes a vision that calls for the creation of a DoD logistics enterprise able to support rapid, agile employment, deployment, and sustainment of the Total Force across the full spectrum of operations in a cost-effective manner.

1.6.2.5. DoD and commercial adopters of RFID believe the derived improvements resulting from RFID implementation are compelling, and the following benefits can be achieved:

1.6.2.5.1. Hands-Off Data Capture

1.6.2.5.2. Improved Data Accuracy

1.6.2.5.3. Improved Logistics Processing Times

1.6.2.5.4. Improved Manpower Utilization

1.6.2.5.5. Enhanced Interoperability with Industry

1.7. Operational Requirements for RFID

1.7.1. The requirements for RFID are derived from the AIT Operational Requirements Document (ORD) and are as follows:

1.7.1.1. Provide inside-the-box item level visibility of commodities while in-transit and in-storage.

1.7.1.2. Logistics transformation and knowledge-enabled sense and respond logistics.

1.7.1.3. Implementation of RFID is a strategic imperative, necessary to streamline the supply chain to the warfighter.

1.7.1.4. Hands-free processing of material, and enhanced asset visibility to the last tactical mile.

1.7.1.5. Enhanced CSS C2 capability to achieve focused logistics dominance and the sense and respond requirements of the warfighter in all environments under any conditions.

1.7.1.6. Move toward hands-free data capture in support of business processes in an integrated supply chain enterprise as an integral part of the comprehensive suite of AIT technologies.

1.7.1.7. Increase supply chain performance and reduce total life-cycle system cost.

1.7.1.8. Adopt and integrate RFID at a tempo consistent with resources available and achievement of expected return on investments (ROI).

1.8. Challenges and Vulnerabilities

1.8.1. RFID technology is relatively new and its widespread use in supply and distribution operations poses some formidable challenges and may create some vulnerability within the logistics system. Current legacy automation systems are scheduled to transition to GCSS-MC and whether to enable the current automation systems for near-term benefits or wait for GCSS-MC fielding must be determined. Active RFID is a proven tool for providing inside-the-box, in-transit visibility of contents in containers and pallets and it has mitigated some of the cost experienced during DS/DS in the current OEF/OIF operation. The infrastructure to support OEF/OIF was fielded to a great extent. The architecture has several components and less than a complete fielded capability will result in asset visibility black holes in the distribution pipeline. If one of the key pieces of the infrastructure, communications connectivity to the required AIS is missing or broken, the flow of automatically generated source data may either stop, become intermittent or unreliable. That being said, the Marine Corps has, generally, been achieving high read rates of Active RFID tags

1.8.2. The Marine Corps is fully committed to the implementation of Passive RFID and will move toward full implementation and integration into the USMC logistics chain processes as we achieve read rates in the 98-99% range, during our pilots.

1.8.3. As is often the case when adopting new technologies into an organization's business process, planning and execution challenges as well as potential vulnerability must be addressed. The following constitutes important considerations and performance measures that must be met, related to the infrastructure and connectivity requirements of RFID:

1.8.3.1. The current DoD RFID policy requires the lowest level of passive RF tagging at the case level. A meaningful number of the items being acquired, received, stored, inventoried, issued, located, tracked or monitored, must have a suitable RFID tag affixed at the appropriate individual item level to bring value to the Marine Corps logistics process.

1.8.2.2. Passive and Active RFID must work in unity to realize the true benefits of the technology to the supply chain. Aggregation or nesting of case, pallet, or in the future item level tags to the active data rich tag, can only be accomplished if the tagging systems interface with one another. To achieve content level detail on a large container with an active data rich tag, each individual EPC passive tag's data must be loaded to the active tag. Then to achieve auto receipt capability at destination, the active tag data must be written in a manner consistent with the requirements of the receiving AIS (eg; ATLASS, STRATIS, GCSS-MC, etc.)

1.8.3.3. The AISs designated to receive and process data collected by RFID devices must be modified as necessary to be able to effectively accept the data stream and make appropriate use of that data. In addition, the EPC construct may require changes to AIS upstream of the receiving system to support meta-data requirements. When required, interfaces and middleware programs must be prepared or procured to facilitate data transfer.

1.8.3.4. Active tags are tested, however, EPC passive RFID tags and equipment must be designed to operate effectively in all of the expected harsh military operational environments, with a capability to withstand the potential extremes.

1.8.3.5. Active RFID readers (interrogators) generally operate at the 0.3 milli-watt power level. Passive RFID readers operate at the 1-5 watt power range. Power and frequency determine the read and write range of the signal and must have appropriate certification. Active RFID operating at 433.92 MHz is almost universally applicable over the globe and has approvals. Passive RFID will operate in a range from 860-960 MHz in order to have global application. In determining site approvals, frequency allocation will have to be requested and approved from each country in which RFID capabilities will be established.

1.8.3.6. The initial infrastructure investment in RFID is going to be expensive, regardless of who pays. Therefore a long-term plan is the best approach to 'growing' into the use of RFID. In addition, multiple applications for RFID should be explored to capitalize on infrastructure investments (e.g. access control, movement tracking, commodity visibility, document recording on a single RFID network). Sustainment of architecture following installation must also be considered in the installation costs as well as technology refresh and upgrade.

1.8.3.7. Logistics communications have not been assured in the past and are being upgraded to support tactical requirements. The introduction of EPC Passive RFID will require the use of Advanced Shipping Notices (ASN) in 856 format. Without the ASN, the system does not know how many tag reads to look for in order to successfully determine if all material arriving at destination is accounted. At present, the ASN is likely to be an additional communication requirement to the current logistics data flow support supply and distribution operations.

1.8.3.8. The single most significant challenge to implementing use of active and passive RFID in supply, distribution, and other functional processes is culture of the workforce and discipline. All personnel in functional processes enabled by RFID that have responsibility to populate tags with data, or interface with RFID architecture equipment or data, must be fully trained.

1.8.3.9. For in-transit and overall asset visibility purposes, tagged material must have a logical route that is enabled with read capabilities. Within CONUS that means trailer transfer points, railheads, major highway intersections, freight consolidation points, and commercial distribution centers handling Marine Corps cargo. In addition, mobile and handheld readers must be available to facilitate the automatic identification of tagged material by both the material custodians and operational forces. This extensive infrastructure of fixed, mobile and handheld readers, as well as the supporting communications and computer and reference database capability, must be available in order to ensure that the data on the tags can be readily acquired and interpreted by any authorized person, anywhere, and at any time that the operational need arises.

1.8.3.10. As the application of RFID grows the potential security risks will increase. RFID networks will have to have measures applied to keep unwarranted access out and protect the visibility of sensitive and hazardous materiel from being compromised or interdicted. In the world of terrorism, supply and distribution can be disrupted by unauthorized access to asset visibility media. In addition, local changes might be made to re-writable tags that disrupt or corrupt supply databases and result in delivery of wrong items or to the wrong locations at a critical time of need.

1.9. RFID in Non-Logistics Applications

1.9.1. This RFID CONOPS and Strategic Implementation Plan focuses primarily on the logistics applications of RFID technologies. There are other categories of use for RFID that require unique capabilities of this technology. Remote sensors, security applications, location of objects in three-dimensional space, and electronic security of shipments or conveyances are all possible using RFID.

1.9.2. It is not the intent of this plan to restrict the innovative application of RFID to logistics or supply and distribution only. The Department of Homeland Security (DHS) has common applications and overlapping benefits with the DoD using RFID. A case in point is the innovative application of RFID in providing force protection and access control (e.g., RFID-based contact less key entry, car road and parking passes, personal ID card, etc.). The use of sensors to remotely collect, record and communicate environmental data or provide security alarms are just of few of these special applications.

1.9.3. Some closed system applications may require non-standardized adaptations of the technology and the content data. Such uniqueness must be considered when coordinating the implementation of such initiatives in order to take full advantage of RFID's potential.

1.9.4. The use of RFID in non-logistics applications may still require coordination to ensure spectrum management and de-confliction of the architecture. Power and frequency interference is a constant consideration in any RFID application, passive or active.

1.10. Inter-Relationship With Other Service/Joint Supply Chain And Distribution Management Elements. The Marine Corps will coordinate their efforts to implement active and passive RFID with the other Services and DoD agencies to ensure one seamless and integrated DTS support DoD. The Marine Corps will work to connect its current and future logistics AIS with the DoD logistics systems of record. The RFID CONOPS and implementation strategy implies this task throughout.

CHAPTER TWO

Doctrine, Organization, Training, Materiel, Leadership Personnel, Facilities (DOTMLPF)*

2.1 Introduction

As new equipment is introduced in the Marine Corps an analysis must be conducted to ensure integration throughout the MAGTFs and the Supporting Establishment. Although RFID equipment are, primarily, enablers covering a wide spectrum of business practices, it is important that they be examined in a manner consistent with the Expeditionary Force Development System (EFDS).

2.2 Doctrine

2.2.1. For the Marine Corps to successfully implement RFID and other AIT throughout the logistics chain, a number of collateral efforts will have to be undertaken to ensure total similarity among the various policies, procedures and technical documents that provide the Marine Corps guidance.

2.2.2. RFID is an enabler for business processes, streamlining redundancies and simplifying the means to meet logistics requirements and gain improved visibility of the logistics chain. Logistics processes may touch a wide variety of commodities such as the multiple facets of supply, maintenance, distribution, transportation, medical support, facilities, etc. As such, the introduction of RFID throughout logistics processes will require doctrinal changes to multiple documents. These will include the spectrum of publications from basic Supply Instructions (SIs) to, potentially, the entire "4" series of Marine Corps Warfighting doctrinal publications. Accordingly, the Deputy Commandant for Installations and Logistics (DC I&L) will direct a review of all Marine Corps' logistics doctrinal publications are conducted to ensure they meet the requirements associated with the implementation. LPD will draft a tasking letter on behalf of DC I&L to the Functional Advocates directing a review of logistics publications and the impact of RFID implementation and will monitor the review and update of each publication.

2.3 Organization

2.3.1. The introduction of RFID is likely to have a minor impact at the organizational level. RFID – active and passive, act as enablers to logistics and other processes and thus provide a means to gain more accurate visibility of inventory, equipment tracking, etc. As such, opportunities for manpower reductions or increases are minimal.

2.3.2. Fielding of RFID equipment has already begun in limited quantities at a number of commands both in CONUS, OCONUS, and deployed. Subsequent fielding will be provided based on operational requirements of the respective MARFORs and MEFs. The current plans

* Although DOTMLPF is addressed in this chapter, RFID Implementation has not been routed through the formal combat development process

are to provide those organizations most affected by current operations, interrogators (permanent, mobile, and handheld), servers, tags, and associated equipment. Representatives from throughout the Operating Forces and Supporting Establishment will make the determinations. Specific dates are to be determined.

2.4 Training

2.4.1. In conjunction with the implementation of various elements of RFID technologies a series of formal and informal training sessions will be performed to ensure users/operators gain a level of familiarity with the systems and know how to most effectively use them.

2.4.2. On-site, hands-on training will be provided during installation, AIS upgrades, exercises, and testing. Training will include hardware operation and maintenance, operational procedures, and system administration. The actual installed hardware and software will be used during training whenever possible. If classroom training is requested, Marine Corps Bases and Stations should make every effort to provide appropriately equipped facilities, to include projectors, computers, etc. as required. All other training materials will be provided by MARCORSYSCOM, the operational forces, or the contractor/manufacturer providing the training and performing the installation/upgrade.

2.4.3. Initially, the standard approach will be a "train the trainer" method with the Marine Corps' formal schools ultimately assuming the training responsibilities for its personnel. As new technologies or enhancements to current enablers are introduced, MARCORSYSCOM with support from vendors/contractors will provide a combination of training plans and instruction that will guarantee the Marine Corps can fully deploy the technology and develop its own Individual Training Standards (ITS) and training plans to be executed by the Marine Corps Training and Education Command (TECOM). Further, during the introduction of any upgraded AIS, training will be required to ensure users and/or technicians are competent in the basic functionality, troubleshooting and/or repairs of the system and hardware. Simultaneous to the introduction of the upgraded AIS, TECOM, in conjunction with the manufacturer and/or systems developer and with functional advocate representation, will develop training plans and curricula to be introduced into the respective MOS schools.

2.5 Materiel

2.5.1. There are a multitude of materiel requirements associated with the implementation of RFID throughout the Marine Corps. In particular, the lifecycle management, the integration with the Marine Corps logistics systems, fielding, and acquisition and funding must be thoroughly considered.

2.5.2 Information Systems Integration. As the Marine Corps proceeds with its purchases of RFID it will be integrated into Global Combat Support System-Marine Corps (GCSS-MC) construct and other future logistics systems. This will ensure overall integration of technology and thus eliminate logistics systems stovepipes. Additionally, GCSS-MC is being designed to meet the Combatant Commanders Information Requirements for Combat Support (e.g. CINC 129) requirements that will ensure integration with Joint and other component

information requirements. All systems and software applications must be Marine Corps Enterprise Network Designated Approving Authority (MCEN DAA) approved before they are allowed to connect or operate. Equipment and software not MCEN DAA approved may not, *initially*, be connected to Marine Corps Base Local Area Networks (LAN). MARCORSYSCOM is responsible to pursue MCEN and NMCI certification for all logistics AISs and AIT enhancements to current logistics systems.

2.5.3. **Fielding**. The fielding of RFID will be achieved incrementally, throughout the Marine Corps based on operational requirements. Operational requirements will be determined by representatives of a Working Integrated Product Team (WIPT) with members from the Operating Forces, Marine Corps Combat Development Command (MCCDC), MARCORLOGCOM, MARCORSYSCOM and the Deputy Commandant for Installations and Logistics. Headquarters Marine Corps (LPD) and MARCORSYSCOM will co-chair the WIPT.

2.5.4. In particular, fielding of RFID capability is consistent with the above paragraph and is currently underway throughout the Marine Corps. IOC of Active RFID has been attained and FOC will be achieved during FY-06. Recommended sites for the installation of active RFID interrogators include major thoroughfares, staging areas and areas with concentrations of sustainment supplies. These may include gates at bases/stations, SMU/ISSAs, large container lots, rail heads, staging areas in preparation for embarkation, and the like.

2.5.5. RFID Equipment Life-Cycle Support. As RFID is implemented, the primary means of maintenance will be through contract logistics support (CLS). Hardware items typically have warrantees lasting one to three years, while software items have warrantees for a period of one year from the date of delivery. The manufacturer's warranty covers parts only. During the warranty period, all labor costs, outside the warranty, associated with equipment troubleshooting, removal, and replacement are the responsibility of MARCORSYSCOM. Upon expiration of the warranty, local commanders are responsible for funding of the logistics support associated with the equipment.

2.5.6. During deployed operations, if an under-warranty RFID component fails it should be returned to the manufacturer for repair after notification to MARCORSYSCOM identifying the problem. In garrison, however, business rules established by MARCORSYSCOM on behalf of the local MAGTF/Base/Station Commander and the manufacturer will determine if components are to be returned to the manufacturer or if on-site logistics support will be provided. Post-warranty life-cycle maintenance for the equipment will be established and managed by the PM for AIS/GCSS-MC. This will ensure centralized life-cycle management is performed, allowing the enterprise to gain economies of scale in its maintenance effort.

2.5.7. In a deployed environment the local Combatant Commander has historically provided support at the outset, then transferring funding responsibilities to each Service Component. In instances where Combatant Commanders are either unwilling or unable to establish support MAGTF Commanders may establish local contracts until that time when MARCORSYSCOM can establish adequate support.

2.5.8. Initial fielding of RFID equipment will be through funding provided by MARCORSYSCOM. This includes RFID tags, interrogators, mounting equipment, and contractor installation. Each MARFOR will establish an RFID tag management system to account for the number of RFID tags held within each of their MSCs. Additional RFID tags may be procured by the operating forces through MARCORSYSCOM .

2.5.9 Acquisition & Funding. Acquisition of RFID hardware and software will be conducted by MARCORSYSCOM after coordination through Headquarters Marine Corps (LPD). Centralized purchasing will ensure compatibility Marine Corps-wide and minimize interoperability problems throughout the Marine Corps. Figure 2-1 below details the planned funding through 2011 for RFID and barcode equipment.

POM 2006-2007 ($M)						
	FY06	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**
AIT POM Position*	8.8	10.8	13.8	16.5	10	11.3
Active RFID POM Position	5.5	7.4	10.3	12.8	6.2	7.2
Barcode Equipment for Legacy Systems	3.3	3.4	3.5	3.7	3.8	4.1

*This covers transportation support systems only.

Figure 2-1

Once RFID capabilities are implemented across the Marne Corps, the responsibility for operations and maintenance funding will be borne by the individual MAGTF through O&MMC funding. Current plans will be to support initial O&MMC through Contract Logistics Support (CLS) and following expiration of CLS, O&MMC funding will be required. Further detail is discussed in paragraph 4.8.

2.5.10 Retrograde and Disposal. Retrograde and disposal instructions associated with RFID equipment will be performed in accordance with instructions published by either original equipment manufacturers (OEM) or by HQMC.(LPD)/MARCORSYSCOM.

2.6 Leadership

2.6.1. The greatest benefit and requirement associated with leadership is top-level understanding and outward support of the capabilities associated with AISs, RFID, other AIT and how they can be integrated into current and future legacy systems. Through this understanding, Marine Corps leaders may influence the introduction and integration of pertinent technologies into a variety of business processes.

2.6.2. The primary point of contact for RFID policy, procedures, testing and evaluation, instrumentation and implementation is the Deputy Commandant for Installations and Logistics (LPD). The point of contact for POM and Budget of specific AIT equipment is MARCORSYSCOM who will coordinate such Service Planning with HQMC.

2.6.3. As RFID capabilities are fielded the responsibility for implementation will reside with MARCORSYSCOM with direction provided by the Deputy Commandant for Installations and Logistics (LPD). As such, MARCORSYSCOM will ensure that key performance indicators are identified, metrics are designed to adequately capture data, and independent analyses are conducted. Further, analyses must be performed to ensure the technologies are being properly used and to ensure a return on investment will be realized.

2.6.4. In conjunction with the previous paragraph, leaders must ensure that each of the technologies are applicable to the Marine Corps business process and that they pose no risk to personnel. Currently, risks associated with RFID technologies are minimal and meet the Electro-magnetic Effects on the Environment (E3) standards in accordance with DoD Instruction 6055.11, Protection of DoD Personnel from Exposure to Radio-frequency Radiation and Military Exempt Lasers. As future technologies are developed, Marine Corps leaders must continue to ensure they meet the standards of the DoD Instructions or follow-on documentation.

2.7 Personnel

2.7.1. There are few impacts to Marine Corps personnel (military and civilian) as a result of the introduction of RFID. It is an enabler for various processes thus its introduction is most likely to affect training plans and curricula associated with Marine Corps Schools, as discussed in the "Training" section of this document. Associated with the introduction upgraded AIS versions containing RFID media, instruction at Marine Corps Schools will be a number of On the Job Training (OJT) courses provided by contract support personnel. OJT will be held aboard Marine Corps facilities during the introduction of the specific technology.

2.7.2. Currently, there are no anticipated organizational or manpower impacts associated with its introduction in any organization. And, although it should simplify tasks and increase accuracy of accounting, tracking, and other functions, it is unlikely to replace personnel or result in organizational change.

2.8 Facilities

2.8.1. The introduction and implementation of RFID will impact facilities in a variety of ways. Although its introduction will likely have the greatest impact on the Operating Forces, it is incumbent on Headquarters Marine Corps (LPD) and the respective Force Commander to engage Marine Corps Base and Station personnel from the outset to ensure all potential installation issues have been addressed.

2.8.2. RFID will be used in a variety of facilities and determinations must be made to ensure adequate space, configuration, and infrastructure requirements. In conjunction with its installation there may be requirements to mount equipment on telephone poles or the sides of facilities. Additionally there may be requirements for dedicated phone lines and electrical outlets to support the functional capability. Final determination of facility requirements will be made in

conjunction with implementation meetings between Headquarters Marine Corps (LPV-1), MARCORSYSCOM, Operating Force and Marine Corps Base and Station personnel. Costs to support will be considered a normal cost of doing business and should be factored in the operating expenses for Marine Corps Base/Station Facilities.

2.8.3. RFID uses wireless, radio frequency transmission. As such there is an impact on the electromagnetic environment and consideration must be given to frequency/spectrum management. Accordingly, all transmitting RFID hardware used aboard Navy ships, at Naval Weapon Stations or at Marine Corps ammunition supply points (ASPs) must be evaluated for HERO prior to use. To obtain the appropriate Hazards of Electromagnetic Radiation to Ordnance (HERO) guidance, commands should contact Naval Ordnance Safety and Security Activity (NOSSA, N84 – phone (301) 744-6095, website <http://www.nossa.navsea.navy.mil>, e-mail inhdnosa-pao.navy.mil)

2.8.4. Additionally, MCEN DAA approval for accessing the LAN, and compliance with the Joint Interoperability Test Command (JITC) for telephone infrastructure is required as it is implemented throughout the Marine Corps. Further, implementation will require that the DoD Information Technology Security Certification and Accreditation Process (DITSCAP) be attained. DITSCAP specifies the IT certifications for security and information assurance, as well as configuration management requirements.

2.9 DOTMLPF Summary

The implementation of upgraded versions of AISs and RFID enhancements across the Marine Corps will reach far beyond the logistics functional areas. As such there are a multitude of organizations, doctrine, regulations and other requirements that must be continually changed, modified and considered. As technology enables the Department of Defense to improve its capabilities to track personnel, equipment and other resources, these requirements will continue to increase.

CHAPTER THREE

ACTIVE RADIO FREQUENCY IDENTIFICATION (RFID)

3.1 Introduction

3.1.1 The Under Secretary of Defense (USD) for Acquisition, Technology and Logistics (AT&L) published a Memorandum dated 2 Oct 2003, which directs DoD components to use high-data-capacity active RFID. In conjunction with this mandate, DoD Components were directed to immediately implement associated business rules to ensure support to Combatant Commanders through in-transit visibility. In the third Memorandum dated 30 July 2004, the USD for AT&L provided business rules for RFID implementation (see http://www.acq.osd.mil/log/rfid/index.htm)

3.1.2 The Marine Corps is implementing Active RFID into the business processes supporting In-Transit Visibility (ITV) for Unit Move, Ammunition, Sustainment (Resupply), and Prepositioning.

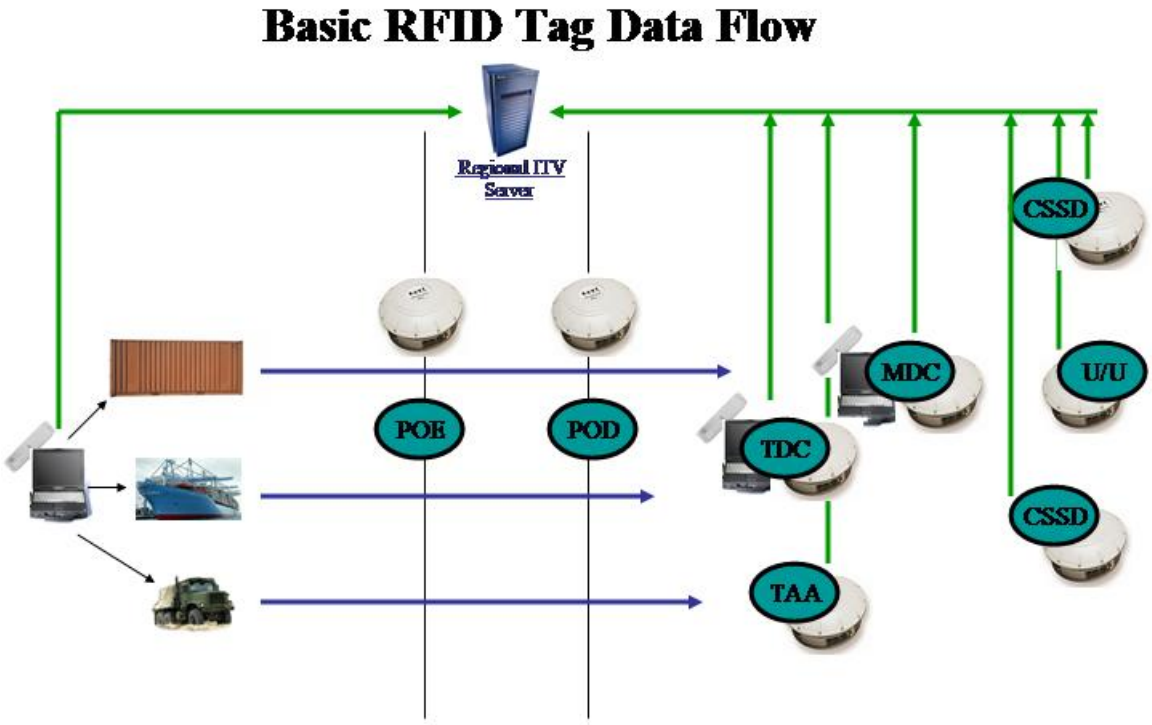

Figure 4-1

3.1.3. Figure 3-1 depicts interrogators at a variety of locations (Using Unit, CSSDs, Materiel Distribution Centers, PODs/POEs, etc.) receiving data signals from the active RFID tags attached to end-items or containers. As the interrogators "read" the signal its location is automatically sent to the Regional ITV server and is available for the sending/receiving units to access.

3.2 Background

Active RFID Tag

3.2.1. RFID technology is based on multiple concepts relating to the way in which an RFID tag is powered, and how it communicates. Active tags contain their own power source and do not rely on outside power to transmit signals. The active tag can be either a beacon tag or a data rich memory tag and can be continuously operating or put to 'sleep' between interrogations to save battery life. Active tag performance characteristics are that they are reusable devices that are non-directional long read range (300 feet or more). The data rich active RFID tag used for inside the box, in-transit visibility within the DoD distribution system cost from about $70 to $100 each. As the active RFID gains wider acceptance the cost of tags will decrease and the performance characteristics will increase.

3.2.2. The standard active RF tag is a data rich device with 128 kb of memory minimum and operates on a frequency of 433.92 MHz with a duty cycle time of 59 minutes. Frequency and power determine the range at which RF tags can be read. The active RF readers operate at very low power ranges, relying on the battery power of the tag to assist in achieving read range. Power output is regulated and limited in accordance with government regulations to minimize electromagnetic interference with other devices. The tag communicates at a guaranteed range of 300 feet for reading and 50 feet for remote writing.

Active RFID Interrogator at Camp Pendleton

3.2.3. The active RF tag operates in an architecture comprised of readers or interrogators, retriever software, modem or satellite communications link, write docking stations, and the regional server network. Active RF readers can be either fixed or portable. Mobile handheld read and write peripherals are also included. Data written to the active RF tags is maintained on the tag and on the RF In-Transit Visibility (ITV) server network. As the active RF tags move through the supply pipeline, strategically located readers interrogate the tag and report the tag ID to the server. To preserve bandwidth, the active RF tag does not transmit all 128Kb of data over the communications link at each interrogation.

3.2.4. Implementation of RFID is not yet fully funded. The initial requirements for RFID DoD-wide was captured in the POM 06-11 submitted in FY04. Availability of funding will impact the speed and schedule for implementation of data rich active RFID tagging throughout the Marine Corps.

3.3 Employment Characteristics. Active RFID has several strong attributes for logistics applications.

3.3.1 Inside-Box-Visibility. Active RFID can be used to provide 'inside-the-box' (container or pallet) content level visibility. By using a handheld reader, the properly applied active RFID tag can be read from a distance to determine what is inside the container or on the pallet without opening or digging through the contents.

3.3.2 Nodal Tracking. Active RFID can provide the last known location of material as it moves through an RFID enabled supply chain. Readers at each node where tagged material passes, can read the tag and report to a central server. The information is available to anyone who needs to know. This is referred to as 'nodal tracking' and is a 'near real-time' asset visibility feed within the distribution pipeline.

3.3.3 Arrival and Departure. Active RFID can be used to provide automatic reading when tagged material passes through a gate. This is most commonly used at installations and distribution nodes to record and report arriving through the arrival gate, and departing through a departure gate. This use of RFID is best when the only data required is when material enters or leaves a location.

3.3.4 Area Coverage. Active RFID can be used to provide continuous visibility of the presence of the tagged material, container or pallet. This is commonly referred to as 'area coverage' and is used to maintain visibility of tagged material while it is in a warehouse yard or assembly area.

3.3.5. Active RFID is omni-directional and interrogators can be employed individually or in groups. Site surveys are conducted to determine the best location to place readers. RFID is subject to interference from other sources of radio waves near the same frequency spectrum. The FCC and host nation frequency allocation is required prior to operating RFID readers. Multiple readers should be employed to provide overlapping read radius and coverage of the area to be read, but not close enough to other readers that the signal from one reader will be read by another.

3.4. RFID-ITV Architecture

3.4.1. The RFID system depends upon the application of RFID tags at the point of origin for equipment or containers. A network of fixed and mobile RFID interrogators at various nodes through the distribution pipeline read and report tag passing. The RF ITV network is therefore reporting last known location of the commodity. This is referred to as near real-time location visibility. The duty cycle (reporting interval) of the RFID interrogators is one hour; every hour the RF ITV network is updated.

3.4.2. During the RFID tag-writing event, the systems of record writes the tag and sends the data to the ITV server. When an active RFID tag passes an interrogator, the updated tag location is provided to the ITV server. Through this, Active RFID enhances in-transit visibility by providing the physical dimension to the DTS.

3.4.3. The RFID-ITV server allows any user to enter the system via a web-accessed account and ".mil" domain address. This web portal allows the user to initiate a query in a number of ways (e.g., through the supply requisition number, national stock number, or transportation control number). There are limitations to the system, however. The server associates relational data gathered through interfaces with other relevant information systems. But the information provided to the user is only as complete as the information pulled from its interfaced ITV systems.

3.5. Implementation Efforts to Date. A variety of Active RFID hardware has been fielded throughout the Operating Forces and this is continuing to expand to improve in-transit-visibility for forces moving both CONUS and OCONUS.

3.5.1. Interrogators have been placed throughout the Operating Forces (note Appendix B to this document). The intent is to maximize the ability of MAGTF and their MSCs to track goods as they move throughout the logistics pipeline. To date, the Marine Corps has installed 45 interrogators and their associated CPUs and has plans to install another 58 to enhance their in-transit visibility of assets. Additionally in excess of 1200 interrogators have been purchased that support Active Tag writing for MDSS II version 7.1

3.5.2. Additionally, 14 Early Entry Deployment Support Kits (EEDSK) and 98 Portable Deployment Kits (PDK) have been purchased and provided to I, II and III MEFs to support a variety of deployment requirements.

3.5.3. MARCORSYSCOM has purchased nearly 200,000 Active RFID tags and distributed them throughout the Marine Corps to support ITV efforts.

3.6. RFID Procedures

3.6.1. RFID instrumentation provides the capability at designated sites to read/write RFID tags and transmit required data to a Regional In-transit Visibility (RF ITV) Server. The four regional RF ITV servers replicate data to provide global visibility to all customers. The servers in USAREUR and CENTCOM have additional capabilities to map satellite-enabled conveyances and display their location over the web. RFID instrumentation includes read/write-docking stations, interrogators and handheld devices.

3.6.2. Organizations with RFID read and write equipment requirements will coordinate their RFID efforts with MARCORSYSCOM. Procurements and installation assistance will be conducted by MARCORSYSCOM. Contact must be made with MARCORSYSCOM via HQMC LPD before submitting funding document.

3.6.3. The hardware to instrument strategic distribution nodes (Air and Seaports) will be procured by USTRANSCOM and hardware to instrument wholesale supply distribution centers and vendor sites will be procured by the DLA DDC or DSCs.

3.6.4. Lithium ion batteries, in large quantities, are considered hazardous items for air movement. However, the batteries used in the Savi RFID tags have been determined to be non-regulated and can be moved via air transport as long as they are separated to prevent movement

and short circuit and packed in strong packaging with less than 12 batteries per package. The batteries are not regulated when installed in Savi tags.

3.6.5. When not in use, the tag battery will be reversed in its compartment to "turn off" the tag. Containers and pallets that have not been un-stuffed or unloaded should not have RFID tags disabled. To turn the RFID tags back on, the battery is placed in its normal operating position.

3.6.6 Fixed RFID Interrogators are placed at key locations (typically located at gates, marshalling yards, rail heads, etc.) to ensure capture of passing active RFID tags entering and leaving base, posts, and stations. The interrogator is registered to the site by sending to the ITV server the interrogator number, POC information, lat/long of the interrogator, and the device name and description. The time is registered as GMT (ZULU) time for standardization and simple conversion. The interrogator sends a signal, wakes up any RF tag of any passing through its RF area, captures the tag number of the passing tag, and then directs the tag back into an inactive status. Fixed interrogators are being/have been installed at all USMC facilities throughout the east coast, west coast, WESTPAC and deployed forces in the CENTCOM AOR.

3.7. Active RFID Tagging Requirements

3.7.1. Active, data-rich tags are a DoD requirement for consolidated cargo shipments going from CONUS to OCONUS, OCONUS to CONUS or between Combatant Commands. Where minimum RFID tagging requirements are specified, supported Combatant Commanders may levy additional requirements in Operation Plans and Deployment Orders, etc., if needed to support Asset Visibility and In-Transit Visibility requirements for operations and/or exercises. These RFID tagging requirements do not supersede existing requirements to provide electronic movement and manifest information to the Global Transportation Network (GTN). Data formats used in the active RFID tags are specified in the RFID Data Format 2.0 of May 2002.

3.7.2. Active RFID tagging guidance applies to all Marine Corps organizations originating shipments that result in stuffing a container or building a pallet and are responsible for writing content level detail to the tag, sending the data to the ITV Server and attaching data rich active RF tags to its respective container, end-item, etc.

3.7.3. In accordance with the DoD Memorandum of 30 July 2004, The Marine Corps will use high capacity, data rich active RFID tags for all shipments entering the DTS going to and from CONUS and OCONUS locations, to include retrograde and Maritime Prepositioning Force (MPF) equipment.

3.7.4. Apply RFID tags to containers (SEAVANS, MILVANS, Quadcons, Sixcons and Palcons), 463L pallets, Principal End Items (PEIs), and that equipment designated by the Unit Commander. All shipments including redeployment and prepositioned stocks or War Reserve must have active data-rich RFID tags written and applied at the point of origin. Content level detail will be provided in accordance with the current DoD active RFID policy memo, 30 Jul 04.

3.7.5. RFID tag read/write capability will be established at all major distribution nodes and installations where unit deployment either originates or terminates. All major shipping and transportation nodes will be enabled in a phased schedule as outlined in this plan.

3.7.6. The RFID data may be burned (the process of writing data to RFID tags is referred to as "burning") to a tag through multiple logistics automated information systems (AIS) – these include Automated Manifest System-Tactical (AMS-TAC), Cargo Movement Operations System (CMOS), and MAGTF Deployment Support System II (MDSS II). Once written, the tag information and burn station registration data is sent to one of four RFID ITV Servers located around the world. As cargo enters the Defense Transportation System (DTS), fixed and deployable interrogators are strategically located throughout the pipeline, i.e., base/station gates, Ports of Embarkation (POE), Ports of Debarkation (POD), container lots, Tactical Assembly Areas, etc. to identify the location of the respective equipment. The interrogator then transmits the tag number, interrogator number, and date/time group (DTG) to one of the ITV servers. This builds the tracking history of the tag/shipment. In addition, Marines may be stationed at strategic nodes such as the PODs and Theater Distribution Centers (TDC) to expedite Marine Corps shipments forward with an accompanying RFID tag. When received by the deployed MAGTF, the MAGTF Distribution Center (MDC) may consolidate and manifest sustainment shipments down to the last tactical mile using RFID technology. This same process works in reverse for retrograde, redeployment, and reconstitution of forces and equipment.

3.8. Recovery and Return of RFID Tags

3.8.1. The active RFID tag is a reusable commodity. Units receiving shipments with RFID tags must make it a practice to recover and re-use the active RFID tags as part of subsequent shipments or retrograde shipments.

3.8.2. Once a tagged item reaches its final destination, the receiving organization is responsible for recovery and re-use of the Active RFID tag. The tag data shall be erased and the battery reversed.

3.8.3. Should a unit exceed their requirement of RFID tags, excess will be reported to higher headquarters for disposition /re-distribution instructions. If MEFs and/or MARFORs determine they are excess, they will contact the Marine Corps Systems Command AIT office within Product Group 10 (PG-10) to receive disposition and/or redistribution instructions. If directed to send to DLA, Marine Forces Command and Marine Reserve Forces will return tags to Susquehanna, PA and Marine Forces Pacific Commands will return tags to San Joaquin, CA. The addresses are:

Distribution Depot Susquehanna, PA
Attn: DDSP-OMP
Warehousing Branch
Building 203 Door 12
Mechanicsburg, PA 17055-0789

Distribution Depot San Joaquin, CA
Transportation Office
DDJC-TA
Warehouse 30
25600 S. Chrisman Rd
Tracy, CA 95376-5000

3.9. Funding

3.9.1. The cost of implementing and operating, maintaining and renewing active RFID technology (to include active tags) and infrastructure, less the cost of supporting utilities, will be borne by MARCORSYSCOM. It is the responsibility of the activity at which containers are built or reconfigured to ensure sufficient quantities of RFID equipment (tags & brackets) are available to support the operations.

3.9.2. If the originating activity of the container is a vendor location, it is the responsibility of the procuring Service/Agency to procure sufficient RFID equipment or provide the written tag to the vendor in time for attaching prior to shipment.

3.9.3. Funding requirements were identified and included in the Program Objective Memorandum POM FY06-11 for RFID. HQMC LPD and MARCORSYSCOM will centrally manage requirements for RFID during the initial start up years. Additional information is provided in paragraph 2.5.9.

3.10 Software Integration. AMS-TAC, CMOS, and MDSS II version 7.1 have the capability to burn RFID tags.

3.11 Maintenance. The equipment procured under the DoD RFID contract is warranted under the provisions of the contract. MARCORSYSCOM will establish a maintenance contract for the fixed interrogators.

3.12 Training. MARCORSYSCOM is responsible for coordinating systems training to include that training for RFID equipment. MARCORSYSCOM in coordination with HQMC and TECOM will ensure that training is conducted both on-site and at formal schools on the equipment and its capabilities. Additionally, MARCORSYSCOM will coordinate training for EEDSKs, PDKs and other portable interrogator hardware and systems.

3.13 RFID Tag Placement. RF tag placement is critical to ensure the tags are properly read by the interrogator. Few RF tags can be read through metal or liquid, so placing the tag inside a metal shipping container or behind a fuel barrel will usually defeat its purpose. The tag must be in an area where the RF signal from the interrogator can reach it; therefore the tag must be placed in central areas, rather than hidden or placed on one side of the item. Active tags will be attached to an item using a minimum of two plastic ties, of at least 50 tensile strength, to reduce breakage and loss of the tag. Use of the RF tag on unit equipment while in garrison is encouraged. An interim RFID Manual and Tag Placement Guide has been published separately by HQMC LPD.

CHAPTER FOUR

RFID - PASSIVE IMPLEMENTATION

4.1 Introduction

4.1.1. USD (AT&L) Memorandum dated 2 Oct 2003, mandated DoD components begin planning for the implementation of passive RFID. Beginning in November 2005, DoD suppliers will be required to place passive RFID tags on the cases and pallets of materiel shipped to the DoD as well as on the packaging of all items requiring a Unique Identification (UID). The Defense Logistics Agency has committed to enabling the strategic distribution centers (San Joaquin, CA, and Susquehanna, PA) with passive RFID technology.

4.1.2. On July 30, 2004, the Acting Under Secretary of Defense for Acquisition, Technology, and Logistics signed a memorandum outlining policy for the use of RFID within the Department of Defense (DoD). The strategy calls for taking maximum advantage of the inherent life-cycle asset management efficiencies that can be realized with integration of RFID throughout DoD. Leveraging this technology to improve our ability to get the customer the right materiel, at the right time, and in the right condition is a critical part of our End-to-End Warfighter Support initiative.

4.1.3. The new policy addresses both active and passive RFID and directs the adoption of specific business rules for the active, high data capacity RFID currently used in the DoD operational environment to ensure continued support for ongoing Combatant Commander in-transit visibility requirements and operations. Additionally, it states that DoD will be an early adopter of innovative, passive RFID technology that leverages the Electronic Product Code (EPC) and compatible RFID tags. The policy will require suppliers to place passive RFID tags on lowest possible piece part/case/pallet packaging once the supplier's contract contains the appropriate language as of January 2005.

4.2. Passive RFID Pilots.

4.2.1. In the Marine Corps' effort to introduce passive RFID, the SASSY Management Unit (SMU) at 2d Supply Battalion was selected as the Pilot site for tactical units in the DoD and piloted during the fall of 2004 (graphically depicted in figure 4-1). In coordination with DLA, the pilot tested the capability to track pallet-level shipments from DLA (Defense Depot Susquehanna, PA – (DDSP)) to the SMU at Camp Lejeune, NC. During the pilot, a server external to the DoD systems was used – this was an "edge server". The Edge Server at DDSP coded the Passive RFID tags sequentially in a non-EPC compliant method. It provided the equivalence of a unique "license plate" for that particular tag - no information other than the tag number was recorded. The Edge Server also created an Advance Shipping Notice (ASN) file that detailed the contents of the pallet to the same level of detail as a DD Form 1348. The ASN file was transferred via FTP to the Storage Retrieval Automated Tracking Integrated System (STRATIS) server at the SMU. As the pallet is

received at the SMU, the Passive RFID interrogator at the bay door* of building 1012 "reads" the RFID tag and sends the license plate data to the edge server at the Camp Lejeune SMU. STRATIS pulled the log file from the Camp Lejeune edge server and match it against the ASN file. At that point an AF1 (a placeholder only) transaction was created for all items associated with the shipment.

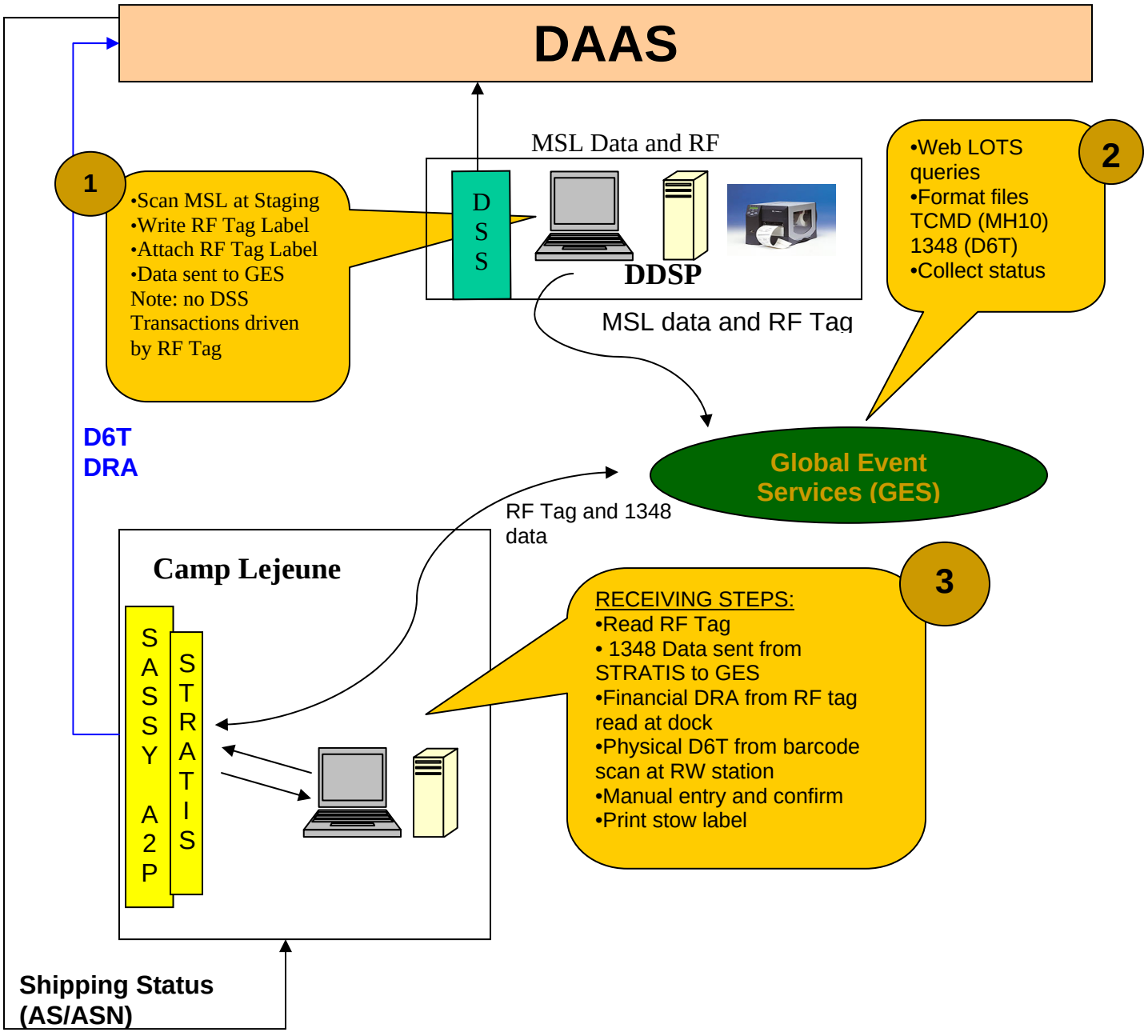

Figure 4-1

* Only one bay door at the SMU had a Passive RFID interrogator, thus it was critical that all shipments were received there.

Although the Pilot for Passive RFID has limited results, the larger plans for passive RFID in the Marine Corps are significantly broader. Figure 4-2 is a scenario of how it could be used in the future in conjunction with GCSS-MC.

PASSIVE RFID - In an ideal scenario, an advance shipping notice (ASN) for a a box containing 10 HMMWV brake shoes is sent through Defense Automated Addressing System (DAAS), and received by a retail-level warehouse (SMU) via GCSS-MC. This information is passed to the receipting area at the warehouse and as the case enters the warehouse bay doors, interrogators located on the sides and top of the door read the tag on the case (a 96-bit passive RFID tag). The tag is linked to a database that ties to the **warehouse management, inventory management, order management, distribution management and financial management systems**.

The database then tells the Warehouseman receiving the shipment to open the case and place 8 brake shoes in the HMMWV brake-shoe storage bins. The system "knows" the location in the warehouse and that information is passed to the warehouseman (**warehouse management**). The system automatically updates the inventory by eight brake shoes (**inventory management**) as they are placed on the warehouse shelves through the use of "smart shelving". Simultaneously, the database informs the warehouseman that of the two remaining brake shoes, one is to be delivered to 2d Battalion 11th Marines and the other is going to 7th Engineer Support Battalion (**order management**). The Warehouseman places them in appropriate bins for pick-up and delivery. Another signal is sent to Transportation Support Battalion (or other distribution unit/organization) informing them that they must stop and deliver repair parts to 2/11 and 7th ESB (**distribution management**). Finally, information is sent to the financial system charging 1st FSSG (Supply Bn for eight brake shoes and 7th ESB for one brake shoe) and 1st MarDiv for (2/11 for one brake shoe) the expense associated with the delivery of the brake shoes (**financial management**).

Figure 4-2

4.2.2. I MEF developed a system called Warehouse to Warfighter (W2W) – it has since been turned over the II MEF Marines in their operations in Iraq. W2W allows both supported and supporting units to track the delivery of inventory from the retail level supply warehouse through to delivery to the customer.

4.2.3. Currently, in the II MEF version of W2W (see figure 4-3), blocks of requisition numbers are associated with a container or pallet and then written to an active RFID tag. The tag data is sent to the National ITV server. When a convoy is loaded with the pallets, the MAGTF Distribution Center (MDC) assigns a Marine as a courier for the load (typically the assistant-driver for a truck). The Marine scans the barcode on the Active RFID tag and loads it to a tablet PC. The tag numbers loaded to the tablet PC are then associated with the convoy and the "convoy delivery session" and the information is fed via satellite

transceiver to the Last Tactical Mile In Transit Visibility (LTM-ITV) server in Vienna, VA. Through the transceiver, supported units may receive near real-time location data of their shipment. The LTM-ITV server then queries the National ITV Server for content-level detail of the associated Active RFID tags. Through the association of the item document numbers to Active RFID tag numbers, customers may then track their order as they move toward their ultimate delivery. As the pallet-container is delivered to the customer the courier clicks the tag numbers that are being delivered. This creates a transaction, routed to SASSY indicating delivery to the customer.

4.2.4. Although, in the example above there is no use of Passive RFID, the process is being used as a springboard to the technology. In the future, Passive RFID will be applied to the cases and pallets being loaded for ultimate delivery and the information associated with the passive tag's number would be loaded to the Global Event Server (GES). Once this action is completed the LTM-ITV server would query the GES server vice the National ITV server to track inventory and inventory tracking would be conducted by supported units querying the LTM-ITV server.

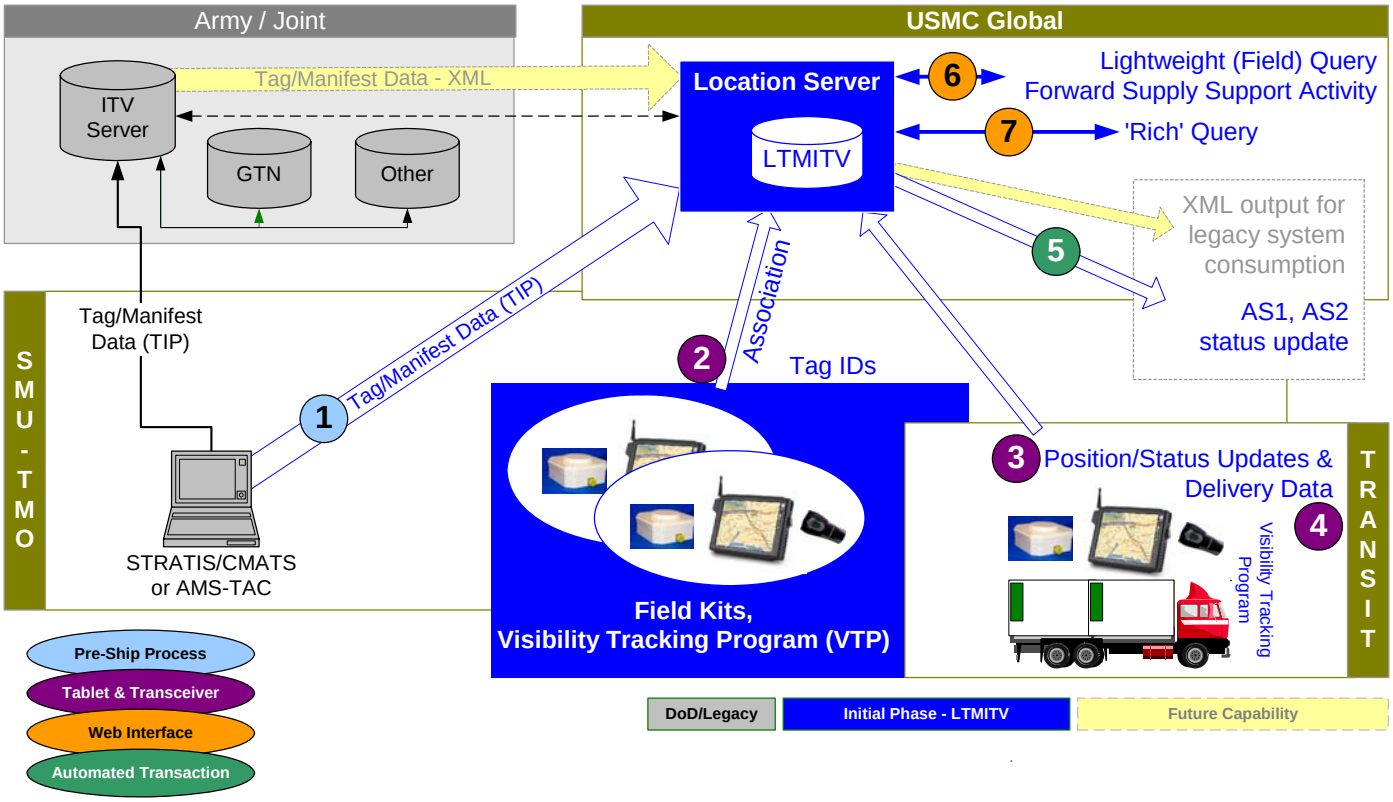

Figure 4-3

4.3. Marine Corps Implementation of Passive RFID. The Marine Corps is fully committed to the implementation of Passive RFID. We will move toward full implementation and integration into the Marine Corps logistics chain processes as we achieve high 90% read rates during our pilots.

4.3.1. Passive RFID fielding will be based upon validated requirements of the Marine Corps Operating Forces. Program Objective Memorandum (POM) 06 AIT funding does not include Passive RFID, however, it is a POM 2008 submission to remain consistent with the fielding of GCSS-MC and other logistics IT systems. Block II of the GCSS-MC solution includes a requirement to integrate RFID processes into the overall logistics solution and will be introduced during the FY 2010 timeframe. Additionally, since GCSS-MC is a retail and unit-level AIS, the passive RFID business process will be adopted at the Wholesale level (Marine Corps Logistics Bases Albany, GA and Barstow, CA) upon the successful implementation into GCSS-MC.

4.3.2. **Goals**: The goals associated with implementation are to gain visibility of inventory – both in-stock and in-transit, enhance the process speed for inventory receipting, stocking, picking, and distribution. Further it will provide the means to link to such functional capabilities as financials and other functional capabilities associated with logistics.

4.3.3. To determine how the Marine Corps will gain its greatest return from the implementation of passive RFID a number of supporting actions must be completed. Initially independent laboratory analyses will be examined to assist in hardware selection of the DoD-approved hardware vendors. Subsequently, testing will be conducted by the Marine Corps to ensure DoD-selected passive RFID equipment will function in the austere operational environments in which the Marine Corps operates. . Parallel with the hardware validation, a series of pilots will be conducted to ensure system compatibility with current and future logistics IT systems. This will ensure the technology meets operating force requirements and provide familiarization to users. Additionally, the pilots will demonstrate where further applications may be established to further enable GCSS-MC and its associated logistics systems.

4.3.4. **Performance Measures**. Several performance measures must be taken to determine the viability of passive RFID prior to full implementation. The basis for these will be in determining read rates and accuracy of items transiting Passive RFID portals. The acceptable read-rate for pallet-level passive RFID tags is 100%. Case-level tags are anticipated to be significantly lower than that. As a pallet is "broken down" it is anticipated that any delta between case and pallet will be eliminated. If it is not, business rules will be adopted making it incumbent upon the Defense Logistics Agency (DLA) to replace any shortfalls. There will be further evaluations conducted during the pilots, discussed later in this chapter. Additionally analysis of business processes, the means in which the data is transferred from the tag to RFID hardware, its associated systems the link to legacy systems and, ultimately, GCSS-MC will be analyzed. These capabilities, when fully implemented, will allow for dramatically improved tracking of inventory - for both the customer and supporting unit - as well as increased process times for receipting, storage, etc.

4.3.5. Consistent with an improved capability of inventory tracking will be an improved capability to gain In-Transit Visibility (ITV). The Marine Corps has no bench-marks for which to apply a current level of ITV but adding the capabilities of RFID to the logistics chain will likely increase to 60-70% of in-transit resources being shipped by DLA depots . Further, with the enhancement of ITV it is anticipated that inventory levels may be

reduced up to 15%. As pilots are conducted and results provided, enterprise-wide inventory goals will be developed.

4.3.6. The funding requirements to support Passive RFID pilots are included in Appendix H. As the pilots are conducted the Marine Corps will capture the actual costs of pilots and the roll-out of the technology. As greater granularity is gained, program costs will be examined to ensure adequacy of funding. Further resources include the use of the Marine Corps Logistics Management Teams (LMTs) to support data collection and analyses of the various pilots and implementation.

4.3.7. Beginning in POM 2008 the Marine Corps plans on providing funding for Passive RFID – it is segmented to provide for adequate piloting of system capabilities (see paragraphs below) prior to initiating system implementation. This approach will enhance user knowledge, familiarity and confidence. The requested funding is as follows:

FY-2008	FY-2009	FY-2010	FY-2011	FY-2012	FY-2013
$684	$950	$1,519	$1,283	$1,427	$9,996

Figure 4-4, POM-08 Funding Request ($000)

4.3.8. Current plans are to conduct four pilots to ensure the viability of Passive RFID. The pilots will be initiated to observe RFID functioning in multiple environments and determine hardware and associated software effectiveness. The rough plan for these pilots is as follows:

4.3.9. **The First Pilot**, will be conducted at Marine Corps Logistics Command during FY 2008. This pilot will determine two major issues. First, test the capability of the technology in a static environment to provide reads, determine read-rates and transfer data among various wholesale-level Marine Corps logistics systems. Second, the pilot will be used to help determine the cost of implementation of RFID throughout the Marine Corps.

4.3.9.1. Interrogators will be installed at the supply warehouse at MARCORLOGCOM to track case and pallet-level inventory being received from DLA.

4.3.9.2. Pallets will be received at the Supply warehouse through the RFID-enabled bay doors, where pallet and case-level tags will be read. Pallets will then be moved to trans-shipment points where individual cases will be scanned. Any cases not read in the initial receiving of the pallet will be at this point. Further any discrepancies between the pallet tag and the cases received may be reconciled and those cases not received will be re-ordered from DLA.

4.3.9.3. During the pilot six bay doors will have interrogators installed, approximately 8 hand-held devices will be used.

4.3.9.4. Detailed accounting will be conducted to assist in determining the total cost of implementation. Current costs are derived from hardware costs and estimated

integration and other direct costs. It is anticipated that an EPC-2 Source Selection Board will be held between now and 2008, which will result in a change in hardware costs and associated services and installation.

4.3.9.5. Metrics will be developed that will reflect the cumulative effect on personnel requirements associated with receiving, receipting and acceptance of inventory, impact on inventory levels, overall cost of the insertion of the technology.

4.3.10. **A second pilot** will be conducted at a **Supply Management Unit (SMU)** during FY 2009. The intent of this pilot is to provide the means to evaluate RFID technology and the Marine Corps' future logistics processes. The pilot will test the functional capabilities of the technology, the means to integrate with GCSS-MC and link with the National Inventory Management System (NIMS).

4.3.10.1. The pilot will test the ability of the systems to accept 856 transactions/ASNs and the means to perform actions based on the information received. This will include inventory planning, receiving, receipting and acceptance. Additionally, this pilot will provide the Marine Corps the opportunity to test Passive RFID Generation 2 equipment/standards.

4.3.10.2. As in the LOGCOM pilot, pallets will be received through the RFID-enabled bay doors, where pallet and case-level tags will be read. Pallets will then be moved to trans-shipment points where individual cases/boxes will be scanned - any cases not read in the initial receiving of the pallet will be at this point. Further any discrepancies between the pallet tag and the cases received may be rectified here and those items not received may be re-ordered from DLA.

4.3.10.3. During the SMU pilot six bay doors will have interrogators installed, approximately 8 hand-held devices will be used and a conveyor/table reader-interrogator may be used as well. Further, printers will be purchased for the user to gain familiarity with writing tags for the returns process – assuming DLA will have the capability to accept returns tagged with RFID. There will be no passive RFID capability established at the supported unit level.

4.3.10.4. Metrics will be developed that will reflect the cumulative effect on personnel requirements associated with receiving, receipting and acceptance of inventory, impact on inventory levels, overall cost of the insertion of the technology. A separate metric will be developed to determine utility and effectiveness for supporting the warfighter.

4.3.11. A **third pilot** will be conducted at a Marine Corps Traffic Management Office (TMO) during FY 10. This pilot will be conducted to determine the feasibility of receiving Advance Shipping Notices (856 transactions) through Automated Manifest System-Tactical (AMS-TAC), once those transactions are received they will be passed to the SMU to determine inventory location. Additionally, it will examine the value

to the SMU, that when provided with this information, what resources may be readied to prepare for cross-docking, stocking of items, etc.

4.3.11.1. The pilot will require installation of up to six reader/interrogators and up to ten hand-held devices at the TMO. Four printers that will provide the means to send, as well as receive inventory.

4.3.11.2. Metrics will include read-rate of inbound inventory and one developed to determine the impact on the SMU of being provided inventory location information.

4.3.12. A **fourth pilot** will be conducted during FY 11 with the operating forces to test deployed capabilities of RFID in support of the Marine Corps logistics processes. This pilot will test hand-held and portable devices in austere operational environments. The desired/expected results will be consistent with those tested in the static pilots held at the SMU and TMO and ensure the equipment is functional in a variety of austere conditions ("disconnected" capability) and operational climates such as high heat, humidity, extreme cold, etc.

4.3.12.1. Like earlier pilots, tests will be conducted to examine the ability for the AIT to receive data transmissions and transfer the data to logistics AISs. Associated with the pilot will be the AIS's means to accept the data and perform integrated logistics actions. This includes inventory planning, receiving, receipting and acceptance.

4.3.12.2. Pallets will be received through the RFID-enabled portals, or by Marines using hand-held RFID interrogators. Here, pallets and case-level tags will be read. Pallets will then be moved to trans-shipment points where individual cases/boxes will be scanned - any cases not read in the initial receiving of the pallet will be at this point. Further any discrepancies between the pallet tag and the cases received may be rectified here and those items not received may be re-ordered from DLA.

4.3.12.3. During the operational pilot portals will be established at three or four bay-door equivalents. Additionally, printers will be used for conducting returns and, potentially, distribution of inventory from the retail level to the supported unit.

4.3.12.4. Metrics will reflect the cumulative effect on personnel requirements associated with receiving, receipting and acceptance of inventory, impact on inventory levels, overall cost of the insertion of the technology. A separate metric will be developed to determine utility and effectiveness for supporting the warfighter.

4.3.13. The potential success of the pilots, as determined by the LMTs and the Operating Forces, will carry great weight in regard to the ultimate implementation of Passive RFID throughout the Marine Corps. LMTs will conduct a detailed analysis of the pilots, develop the evaluation reports and report the results to the Deputy Commandant for Installations and Logistics (DC I&L). We will mitigate risk based on the performance of the pilots and adjust requirements, implementation, funding and other changes as necessary.

4.4. **Defense Federal Acquisition Regulation.** A key component to implementing RFID throughout our supplier base has been the publication of a Defense Federal Acquisition Regulation (DFAR) rule governing the application of RFID to the case/pallet/item packaging for materiel purchased by the Department of Defense. The Deputy Under Secretary of Defense (Logistics and Materiel Readiness) (DUSD (L&MR)) has, in conjunction with the Office of Defense Procurement and Acquisition Policy, developed a final rule on 13 Sept 2005 regarding the Defense Federal Acquisition Regulation Supplement (DFARS). This regulatory clause has been in the approval process since Spring 2005. This approval now means that all new contracts executed with DoD suppliers who send material to Defense Distribution Depot, Susquehanna, PA (DDSP) and Defense Distribution Depot, San Joaquin, CA (DDJC) need to apply RFID Tags at the case and palletized unit load levels when shipping packaged operational rations, clothing, individual equipment, tools, personal demand items, or weapon system repair parts. This became effective on 14 November 2005. For more information go to the following website:
< http://www.acq.osd.mil/log/rfid/Federal_Register_2005_09_13_RFID_Final_Rule.pdf >

4.5 EPC Passive RFID

4.5.1. Electronic Product Code (EPC) passive RFID is continuing to emerge as the technology of the future and is destined to change the way the world does business. It gives suppliers and manufacturers the means to track virtually every item, case and pallet through the entire logistics chain. Consistent with this, product Reference (a), attachment 2, includes the initial set of business rules for the implementation of passive RFID and the use of Electronic Product Code compliant tags within the DoD supply chain. The DoD RFID Policy directs that for all new solicitations issued after October 1, 2004, and that require delivery of material on or after January 1, 2005, shall tag all pallets and cartons with EPC-compliant passive tags. The DoD RFID Policy directed an initial capability to read passive RFID tags and use the data at key sites by January 2005. The Logistics Decision Memorandum dated 30 Aug 04 deferred the directive for key sites and limited initial passive implementation to the defense distribution depots.

4.5.2. These rules include the requirement for DoD suppliers to put passive RFID tags on the cases and pallets of material shipped to the DoD as well as on the packaging of all items requiring UID. This DoD policy will continue to be refined as more business process and RFID technology analysis is completed.

4.5.3. The Product Manager Joint AIT has established a multi-vendor contract mechanism to procure EPC-compliant passive RF technology (products and services) consistent with those selected by the DoD EPC-1 RFID Source Selection board. The contract includes competitive vendors providing RFID equipment, infrastructure and integration services that are compliant with published EPC specifications, including technical support, warrantees, and 24/7 Help Desks. Services/commands/organizations will purchase RFID equipment and services using this contract mechanism. A list of the contracts may be found at: <http://www.cecomacw.army.mil/Projects/CECOM/Homepa~1.nsf>. Click on the link for “Awarded Contracts”

4.5.4. Prior to a complete adoption of passive RFID by the Marine Corps, there are a number of issues that must be favorably resolved by the Marine Corps, DoD and/or DLA. These include.

4.5.4.1. DoD must finalize the requirement for use of the EPC in the DoD logistics chain.

4.5.4.2. DoD must publish the DFARS Rule for the application of passive RFID tags at the point of origin (manufacturer/vendor) on items procured by DoD.

4.5.4.3. The PM J-AIT must complete an analysis of applicable regulations and other requirements (e.g., Hazards of Electromagnetic Radiation to Ordnance).

4.5.4.4. In conjunction with the Department of the Navy, the Marine Corps must finalize its RFID policy and implementation strategies. .

4.5.4.5. The Marine Corps must develop an education and training plan for EPC passive RFID consistent with its implementation.

4.5.4.6. Develop the basis of issue plans (BOIP) and AIS migration strategy for EPC passive RF implementation.

4.6. RFID and Shipping Layers

4.6.1. The DoD RFID policy in conjunction with commercial industry has provided a standard construct for identification of shipping layers within supply and distribution. The EPC will be capable of identifying and distinguishing the commodity layer based on the code construct. The shipping layers span the spectrum of both passive and active RFID technologies. The media (active or passive) used for tagging each layer is less important than the data (content detail or simple ID). The combination of active and passive RFID with defined shipment layers is a way to manage shipment processes and procedures within the supply and distribution business processes. The shipping layers defined as follows:

4.6.1.1. Layer 5—Movement vehicle (truck, aircraft, ship, or train) - ***Active RFID tags are typically used at this layer***.

4.6.1.2. Layer 4—Freight containers (20- or 40-foot Sea Vans, 463L pallets with cargo net) or an article of transport equipment that is permanent and strong enough to be suitable for repeated use; ***Active RFID tags are used at this layer***.

4.6.1.2.1. Specially designed to carry goods by more than one mode of transport, without intermediate reloading;

4.6.1.2.2. Fitted with devices that permit ready handling, particularly its transfer from one mode of transport to another;

4.6.1.2.3. Designed to be easy to fill and empty; and…

4.6.1.2.4. Has an internal volume of 1 cubic meter or more.

4.6.1.3. Layer 3—Unit load (warehouse pallet, tri-wall packaging, commercial fiberboard packaging): one or more transport units or other items held together by a pallet, slip sheet, strapping, interlocking, glue, shrink wrap, or net wrap, making them suitable for transport, stacking, and storage as a unit. In distribution, an item or assembly of items ready for handling and transportation as a single entity.

4.6.1.4. Layer 2—Transport unit (cartons, boxes—second level packaging): packaging designed to contain one or more articles or packages or bulk material for the purposes of transport, storage, handling and/or distribution.

4.6.1.5. Layer 1—Package (first-level packaging–sometimes referred to as a "bubble pack"): the first tie, wrap or container of a single item or quantity thereof that constitutes a complete identifiable pack. A product package may be an item packaged singularly, multiple quantities of the same item packaged together or a group of parts packaged together.

4.6.1.6. Layer 0—Product item (individual item): a first-level or higher assembly that is sold in a complete usable configuration.

4.6.2. Figure 4.5, on the next page, is provided to visually portray the concept for how RFID tags may be nested in a particular shipment. The RFID on the carton is a child to the RFID on the pallet and the item contained within the item pack is the child of the specific item pack RFID.

4.6.3. It is important to note that current systems do not allow for the loading of the data associated with Passive RFID tags to be loaded to Active RFID tags.

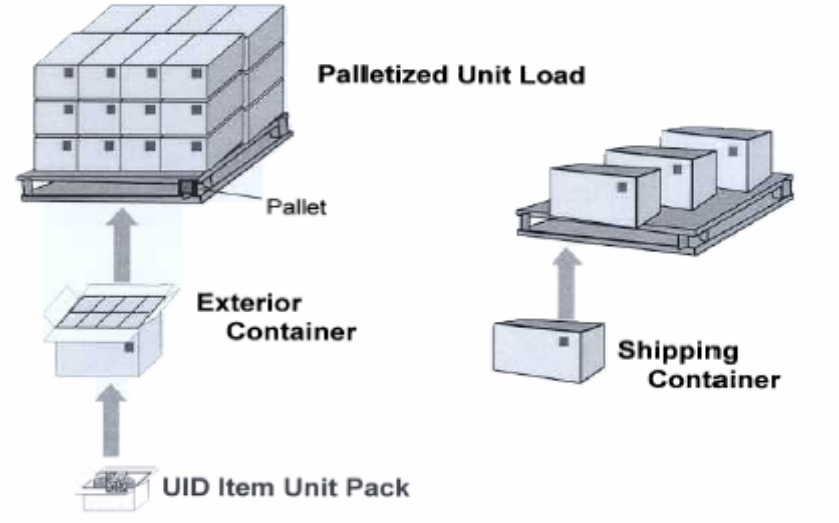

Figure 4-5

RFID Shipping Layers 1, 2, and 3 – this is what will be received by USMC units from vendors/DLA .
Currently, there are no requirements for the Marine Corps to apply Passive RFID tags on shipments. Orientation in addition to the type of packaging and box shape will be a consideration in the procedures for receipt processing as well. Tag orientation will affect the ability to read EPC passive RFID tags and or the rate of read during receipt processing.

4.7. Types of EPC Passive RFID Tags

4.7.1. Passive RFID Tags are described in Appendix D. The EPC passive RFID tags have capabilities designed to support the difference levels of tagging listed above. At this time the Class 0 and Class 1 EPC passive RFID tags with 96 Bits of data capacity are available for use.

4.7.2. The EPC passive tag comes in various shapes sizes and forms. A couple representative tags are shown in figure 4.6 on the next page. The EPC passive RFID tag can be included in shipping labels that also display barcodes and human readable elements. The passive enable RFID Label can then be read by various methods – scanners, imagers, and readers.

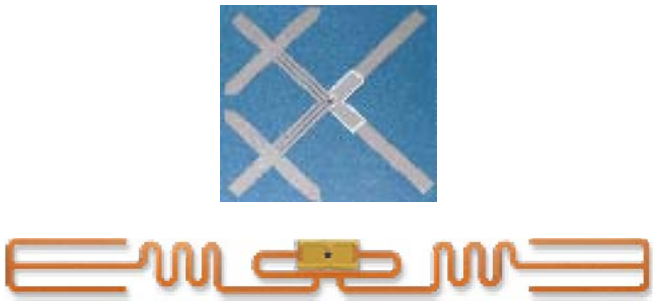

Figure 4.6 – two passive RFID tags

4.8. Cost Benefit

4.8.1. Substantial technological, design problems, and uncertainties remain surrounding Passive RFID. Therefore, cost estimates for large-scale implementations cannot be ascertained with a desirable level of accuracy. To date, the Marine Corps has not been able to identify large-scale adoptions of Passive RFID for which detailed quantitative performance results are available. There is consequently no hard data on which to base cost and benefit estimates, except for isolated instances involving relatively small scales. There are also very few working examples of Passive RFID applications in the Marine Corps and DoD; they are still being evaluated.

4.8.2. Evaluation of the benefits that could be expected from widespread adoption of RFID is the most difficult part of any business case analysis. While it is possible to qualitatively describe the kinds of benefits that could be expected, quantifying them is much harder. At this stage of RFID development and implementation, it is not feasible to adequately quantify cost/benefit or document a business case to support the requisite funding requirements. Hence, there are difficult investment decisions to be made with respect to RFID and any potential contribution to readiness.

4.9. Middleware Automation Systems

4.9.1. The integration of EPC passive RFID will probably require changes to current legacy automated information systems. The lead-time to accomplish these changes may not

support the overall schedule for implementing EPC passive RFID into existing business processes. The AIS integration is critical to optimizing the data collected and reported using RFID.

4.9.2. Middleware interface software solutions will be used in those applications where near term objectives cannot be achieved by changing the current legacy AIS. Middleware will be incorporated or eliminated by the future GCSS-MC enterprise.

4.10. Defense Logistics Management System (DLMS)

4.10.1. DLMS has recently been changed to carry UID information and passive RFID tag information as part of Shipping Status. This is an important part of the implementation of EPC passive RFID into supply operations. This change provides the format for the advanced shipping notice that must be provided in order for the receiving AIS to recognize, account for, and translate incoming the EPC passive RFID labeled or tagged shipments.

4.10.2. The DLMS 856S Shipment Status is used by DOD shippers to provide requisition-level shipment status to the customer and designated status recipients. Changes can be used as a planning tool for establishing techniques for accommodating UID and RFID tag data within transactional exchanges under the DLMS. Component system changes required to support this integration are not yet identified.

4.11 Advanced Shipping Notice (ASN) (856S Format)

4.11.1. The 856S Shipping Status is the DLMSO format for the ASN, formally, the AS1. The ASN is a critical part of the envisioned supply chain functional use of EPC passive RFID. At origin, cases, pallets, and packaging of UID items will be labeled or tagged with EPC passive RFID tags. The inventory of items contained in the shipment at origin must be passed to the destination receiving activity in order for the receiver to know what items and quantities to look for. The ASN is the vehicle that provides this information. RFID readers are essentially dumb devices that only read and report tags read. The AIS must be provided with how many and what layer tags should be read when a shipment is received in order to fully account for everything in the shipment. The 856S Shipping Status format is the ASN for receipt accounting at destination.

4.11.2. The ASN will be communicated to the destination receiver by whatever communications means is established. Communications is an essential part of the RFID architecture. Destinations without communications capabilities and unable to receive ASN will not be capable of ascertaining full shipment receipt using EPC passive RFID tags.

APPENDIX A

MARINE CORPS AIT POINTS OF CONTACT

1. For the Marine Corps, policy for Logistics AIT resides in the Logistics Plans, Policy and Strategic Mobility Division, Installations and Logistics, Headquarters Marine Corps. Marine Corps Systems Command (ISI) retains responsibility for fielding and implementation of specific technologies. Marine Corps Logistics Command (PP&O) has implementation responsibility for Marine Corps RFID resources aboard Marine Corps Logistics Bases at Albany, GA and Barstow, CA, as well as Blount Island Command, FL.

2. Correspondence with these organizations may be accomplished through the address and phone numbers listed below.

Commandant of the Marine Corps
LP Division (Code LPD)
Headquarters, U.S. Marine Corps
2 Navy Annex
Washington, DC 20380-1775

Commercial: (703) 695-7930
Fax: (703) 695-8160
DSN: 225-xxxx

Marine Corps Systems Command
ISI
Building 2079
Quantico, VA 22134

Commercial (703) 432-5127
DSN 378-xxxx

Marine Corps Logistics Command
PP&O
814 Radford Blvd
Albany, GA 31704

Commercial (229) 639-7528
DSN 567-xxxx

APPENDIX B

ACTIVE INTERROGATOR LOCATIONS

The following spreadsheet lists active RFID interrogators frequently used by the Marine Corps

Site Location	Naming Convention	Site Description	Interrogator #
East Coast			
ALBANY	ALBANYR1	ALBANY GA MCLB TRUCK GATE	26232
ALBANY	ALBANYR2	ALBANY GA MCLB MAIN GATE	26153
ALBANY	ALBANYLOADRAMPR1	ALBANY GA MCLB TMO BLDG 1221	24030
BEAUFORT	BEAUFORTGATE1R1	BEAUFORT SC MCAS GATE 1	42239
BEAUFORT	BEAUFORTGATE2R1	BEAUFORT SC MCAS TRUCK GATE	41038
BEAUFORT	BEAUFORTAPOE/DR1	BEAUFORT SC MCAS APOE/D	41037
BLOUNT ISLAND	BICPIERR2	BLOUNT ISLAND FL PIER AREA 200T	42496
CHERRY POINT	CHERRYPTGATE1R1	CHERRY POINT NC MCAS MAIN GATE	40850
CHERRY POINT	CHERRYPTGATE2R2	CHERRY POINT NC MCAS SLOCUM GATE	40851
CHERRY POINT	CHERRYPTAPOER1	CHERRY POINT NC MCAS APOE BLDG 4209	40847
CHERRY POINT	CHERRYPTAPOER2	CHERRY POINT NC MCAS APOE BLDG 4268	40849
LEJEUNE	LEJEUNEMAINGATER1	LEJEUNE NC MAIN GATE	40936
LEJEUNE	LEJEUNETRIANGLER1	LEJEUNE NC TRIANGLE GATE	40900
LEJEUNE	LEJEUNEPINEYGRNR1	LEJEUNE NC PINEY GREEN GATE	23123
LEJEUNE	LEJEUNESNDFERRYR1	LEJEUNE NC SNEEDS FERRY GATE	40943
LEJEUNE	LEJEUNERAILHEADR1	LEJEUNE NC RAIL HEAD BLDG	40947
LEJEUNE	LEJEUNELOT201R1	LEJEUNE NC LOT 201 BUILDING	26083
LEJEUNE	LEJEUNELOT201R2	LEJEUNE NC LOT 201 GATE	40482
LEJEUNE	LEJEUNELMCCR1	LEJEUNE NC LMCC	40937
LEJEUNE	LEJEUNEONSLWBCHR1	LEJEUNE NC ONSLOW BEACH BRIDGE	40784
LEJEUNE	LEJEUNETMOR1	LEJEUNE NC TMO	40848
LEJEUNE	LEJEUNESMUR1	LEJEUNE NC SMU	40957
NEW RIVER	NEWRIVERGATE1R1	NEW RIVER NC GATE 1	40843
NEW RIVER	NEWRIVERGATE2R2	NEW RIVER NC GATE 2	40846
West Coast			
BARSTOW	BARSTOWR1	BARSTOW CA MCLB NEBO MAIN GATE	41071
BARSTOW	BARSTOWR2	BARSTOW CA MCLB YERMO MAIN GATE	41064
FALLBROOK	FALLBROOKR1	FALLBROOK CA NAVAL WEAPONS STATION GATE	23336
HAWAII	KANEOHER1	KANEOHE HI MCBH MAIN GATE	26068
HAWAII	KANEOHER2	KANEOHE HI MCBH AIRFIELD ACCESS BLDG	41059

Site Location	Naming Convention	Site Description	Interrogator #
MARCH	MARCHR1	MARCH ARB CA MAIN GATE ARR/DEP	26288
MIRAMAR	MIRAMARR1	MIRAMAR CA MCAS EAST GATE	26300
PENDLETON	PENDLETONR1	PENDLETON CA MAIN GATE	23321
PENDLETON	PENDLETONR2	PENDLETON CA SMU BLDG 2251 STORAGE	26327
PENDLETON	PENDLETONR3	PENDLETON CA DEL MAR FIRE STATION	26325
PENDLETON	PENDLETONR4	PENDLETON CA TMO	26330
PENDLETON	PENDLETONR5	PENDLETON CA PULGAS GATE	26273
PENDLETON	PENDLETONR6	PENDLETON CA BASILONE & PULGAS RD	26338
PENDLETON	PENDLETONR7	PENDLETON CA AMMO RD & VANDEGRIFT RD	26395
YUMA	YUMAR1	YUMA AZ MCAS NORTH GATE	26091
YUMA	YUMAR2	YUMA AZ MCAS TRAINING CENTER	26102
WESTPAC			
OKINAWA	KINSERR3	KINSER OKI JA GATE 3	26233
OKINAWA	FUTENMAR1	FUTENMA OKI JA MCAS GATE 1	26261
OKINAWA	FUTENMAR85	FUTENMA OKI JA MAG 36 UMA READ	42085
OKINAWA	FOSTERR3	FOSTER OKI JA GATE 3	26204
OKINAWA	FOSTERR4	FOSTER OKI JA GATE 6	41377
OKINAWA	KADENAABR4	KADENA AFB OKI JA 5R ENTRANCE READ 1	26200
OKINAWA	KADENAABR5	KADENA AFB OKI JA 5R BACK LOT READ 2	41033
OKINAWA	COURTNEYMTLOTR1	COURTNEY OKI JA MT LOT AREA	26206
OKINAWA	HANSENR1	HANSEN OKI JA GATE 1	26236
OKINAWA	SCHWABR1	SCHWAB OKI JA GATE 1	26151
OKINAWA	WHITEBEACHR1	WHITE BEACH OKI JA MAIN GATE	26231
IWAKUNI	IWAKUNIR1	IWAKUNI JA MCAS CONTRACTOR GATE	40859
IWAKUNI	IWAKUNIR1	IWAKUNI JA MCAS NORTH GATE	40844
IWAKUNI	IWAKUNIR1	IWAKUNI JA MCAS TERMINAL AREA	40860
IWAKUNI	IWAKUNIR1	IWAKUNI JA MCAS CARGO STAGING LOT	41089
INACTIVE SITES			
29 Palms*	29PALMSR1	29 PALMS CA MAIN GATE	23148
29 Palms	29PALMSR2	29 PALMS CA TMO	26283
29 Palms	29PALMSR3	29 PALMS CA CAMP WILSON	26287
BLOUNT ISLAND	BICR1	BLOUNT ISLAND FL MAIN GATE	26160
SITES TO BE ESTABLISHED			
MIRAMAR	MIRAMARR2	MIRAMAR CA MCAS BLDG 7209 TMO SHIPPING	TBD
MIRAMAR	MIRAMARR3	MIRAMAR CA MCAS BLDG 7209 TMO RECEIVING	TBD
MIRAMAR	MIRAMARAIRFIELDR1	MIRAMAR CA MCAS AIRFIELD GATE 5	TBD
MIRAMAR	MIRAMARAIRFIELDR2	MIRAMAR CA MCAS AIRFIELD GATE 22	TBD
MIRAMAR	MIRAMAREASTGATER1	MIRAMAR CA MCAS EAST GATE	TBD

* All 29 Palms sites awaiting documentation approval.

Site Location	Naming Convention	Site Description	Interrogator #
MIRAMAR	MIRAMARWESTGATER1	MIRAMAR CA MCAS WEST GATE	TBD
MIRAMAR	MIRAMARNORTHGATER1	MIRAMAR CA MCAS NORTH GATE	TBD
MIRAMAR	MIRAMARELLIOTR1	MIRAMAR CA MCAS CAMP ELLIOT	TBD
PENDLETON	SANCLEMENTER1	PENDLETON CA SAN CLEMENTE GATE	TBD
PENDLETON	CRISTIANITOSGATER1	PENDLETON CA CRISTIANITOS GATE	TBD
PENDLETON	PENDLETONRAILR1	PENDLETON CA FALLBROOK RAIL HEAD	TBD
STRATEGIC NON-USMC INTERROGATORS			
OKINAWA	TENGEN SDDC	TENGAN OKI JP PIER MAIN GATE	22014
OKINAWA	NAHAR1	NAHA OKI JA	22029
OKINAWA	NAHAR2	NAHA OKI JA	23374
OKINAWA	KINSERR1-S	KINSER OKI JA WRB 10TH ASG SARSS	40749
OKINAWA	KINSERR2-S	KINSER OKI JA WM7 OP PROJ SARSS	40822
OKINAWA	KADENAABR1	KADENA AB OKI JA CGO PROCESSING	42046
OKINAWA	KADENAABR2	KADENA AB JA IN-CHECK GATE 10 BLDG 49078	40437
OKINAWA	KADENAABR3	KADENA AB OKI JA LINE BATE 19 BLDG 46110	40438

APPENDIX C

BUSINESS RULES FOR ACTIVE RFID TECHNOLOGY

C-1 Overview

C-1-1. Active Radio Frequency Identification (RFID) tags are data rich and allow low-level RF signals to be received by the tag, and the tag can generate high-level signals back to the reader/interrogator. Active RFID tags can hold relatively large amounts of data, are continuously powered, and are normally used when a longer tag read distance is desired.

C-1-2. The DoD Logistics Automatic Identification Technology (LOG-AIT) Office is the DoD focal point for coordinating overarching guidance for the use of AIT within DoD. Army Program Executive Office, Enterprise Information Systems (PEO EIS), Product Manager - Automatic Identification Technology (PM-AIT) Office is the DoD procurement activity for AIT equipment (to include RFID equipment and infrastructure) and maintains a standing contract for equipment installation and maintenance. Headquarters Marine Corps point of contact for all active RFID programming and policy and AIT purchases is LPCD – this will be done to ensure all systems are consistent with the Marine Corps' overall logistics business enterprise and DoD logistics architecture requirements. Procurement for AIT hardware and software will be conducted through MARCORSYSCOM in coordination with the DoD Executive Agent/Program Manager for AIT. This will ensure appropriate documentation of on-hand hardware and includes organizations using organic funding. Users will coordinate RFID equipment/infrastructure procurement through the PM J-AIT Office and tag procurement from DLA to ensure interoperability and compliance with this policy.

C-1-3. The following business rules are applicable to all DoD organizations including Combatant Commanders, Military Departments and support agencies. They support asset visibility and improved logistic business processes throughout the enterprise. These rules specifically apply to DoD cargo shipped internationally; however, organizations may elect to employ the use of active RFID technology for Intra-Continental United States (CONUS) shipments to support normal operations or for training.

C-2 Active RFID Business Rules

C-2-1. Sustainment/Retrograde Cargo All RFID Layer 4[i] freight containers (e.g., 20 or 40 foot sea vans, large engine containers) and palletized (463L air pallets) sustainment or retrograde shipments of DoD cargo being shipped internationally must have active, data-rich RFID tags written at the point of origin for all activities (including vendors) stuffing containers or building air pallets. Content level detail will be provided in accordance with current DoD RFID tag data standards. Containers and pallets reconfigured during transit must have RFID tags updated by the organization making the change to accurately reflect new contents.

C-2-2. Unit Movement Equipment and Cargo. All RFID Layer 4 freight containers and palletized unit move shipments, as well as all major organizational equipment, must have

active data-rich RFID tags written and applied at the point of origin for all activities (including vendors) stuffing containers or building air pallets. Unit move tags will be written from the Deploying Unit Deployment List (UDL) and must be maintained in JOPES Level 6 detail. MDSS II database content will be published in MCO P 3000.18A (FDP&E Manual). Content level detail will be provided in accordance with current DoD RFID tag data standards. Self-deploying aircraft are exempted.

C-2-3. Ammunition Shipments. All RFID Layer 4 freight containers and palletized ammunition shipments being shipped internationally must have active data-rich RFID tags written with content level detail. Tags will be applied at the point of origin by all activities (including vendors) that stuff containers or build air pallets in accordance with current DoD RFID tag data standards. Containers and pallets reconfigured during transit must have RFID tags updated to accurately reflect new contents by the organization making the change.

C-2-4. Prepositioned Materiel and Supplies. The same rules as Unit Movement Equipment and Cargo (para C-2-2) applies to pre-positioned equipment. Execution for current afloat assets will be completed during normal maintenance cycle or sooner as desired. Unit move tags will be written from the Deploying Unit Deployment List (UDL) and must be maintained in JOPES Level 6 detail. Additional instructions for MDSS II database content will be published by LPO-3.

C-3. RFID Infrastructure

C-3-1. USTRANSCOM will ensure that designated strategic CONUS and OCONUS aerial ports and seaports (including commercial ports) supporting OPLANs and military operations have RFID equipment (interrogators, write stations, tags, brackets) with read and/or write capability to meet Combatant Commander requirement for asset visibility. Military and commercial ports will be instrumented with fixed or mobile capability based on volume of activity and duration of the requirement at the port.

C-3-2. Military Departments and Support Agencies are responsible for end-to-end in-transit visibility (ITV) and will ensure sufficient RFID infrastructure and equipment (interrogators, write stations, tags, and brackets) are appropriately positioned to support Combatant Commander Operation Plans and military operations. As above, military and commercial ports will be instrumented with fixed or mobile capability based on volume of activity and duration of the requirement at the port.

C-3-3. To ensure that users take maximum advantage of inherent efficiencies provided by this technology, RFID capability will be operational at logistic nodes and integrated into existing and future logistics automated information systems. RFID recorded events will become automatic transactions of record. Geographical Combatant Commanders may direct Service Components/Support Agencies to acquire, operate, and maintain other theater supporting RFID infrastructure to meet changing theater operations.

C-3-4. As a general rule, an organization responsible for port or logistics node operation is also responsible for installing, operating, and maintaining appropriate RFID capability.

Additionally, when responsibility for operating a specific port or node changes (e.g., aerial port operations change from strategic to operational), the losing activity is responsible for coordinating with the gaining activity to ensure RFID capability continues without interruption.

C-4. RFID Funding. The cost of implementing and operating RFID technology is considered a normal cost of transportation and logistics and as such should be funded through routine Operations and Maintenance or Working Capital Fund processes. It is the responsibility of the activity at which containers, consolidated shipments, unit move items, or air pallets are built or reconfigured to procure and operate sufficient quantities of RFID equipment to support the operations. Working Capital Fund activities providing this support will use the most current DoD guidance in determining whether operating cost authority or capital investment program authority will be used to procure the required RFID equipment. If the originating activity of the Layer 4 container/consolidated air pallet is a vendor location, it is the responsibility of the procuring Service/Agency to procure sufficient RFID equipment to provide to the vendor to meet the requirement. Additionally, Combatant Commanders are responsible for coordinating with their Service Components to ensure adequate enroute RFID infrastructure is acquired and operating at key logistics nodes.

C-5. RFID Tag Return

C-5-1. The DLA automated wholesale management system will provide tags through existing supply channels. The DoD Item Manager for the active RFID sustainment tags is the Defense Supply Center Philadelphia, Inventory Control Point, Routing Identifier Code S9I. Only new Condition Code A tags will be sold to customers.

C-5-2. All returned tags that are serviceable after refurbishment will be received into wholesale inventory as Condition Code B and will be available as free issue from the DLA Defense Distribution Center (DDC) when they are placed on a pallet or container by DDC. This will spread the savings across the DoD Community of active tag users. When DDC requisitions tags, Condition Code B tags will be issued first. If there are no Condition Code B tags available for issue to the DDC, the DDC will pay the standard price for Condition Code A tags. Activities may use the Defense Logistics Management Supplement Materiel Returns Program (MRP) to return tags no longer required and receive reimbursement for packaging, crating, handling, and transportation (PCH&T) costs. Excess tags sent back without MRP transactions will not result in PCH&T reimbursement to the customer. The PCH&T reimbursement incentive for tags received with MRP transactions will result in reduced costs and savings to DoD from reusing the Condition Code B tags. The Military Services, other requisition authorities, and users may opt to establish their own retail operation for used tags and incur the cost of refurbishment themselves. Marine Corps units are not to return tags unless it is determined by Headquarters Marine Corps (LPCD) that the Marine Corps as a whole is excess, otherwise appropriate realignment will be conducted within the Corps.

C-6. RFID Tag Formats. The DoD LOG-AIT Office is responsible for coordinating, establishing, and maintaining RFID tag formats at the data element level. RFID tagging procedures require active data-rich RFID tags be written with content level detail in accordance with approved formats - RF-Tag Data Format Specification, Version 2.0, the current version. RF

Tag data files will be forwarded to the regional in-transit visibility (ITV) server(s) in accordance with established DoD data timeliness guidelines published in the current versions of the DoD 4500.9-R, Defense Transportation Regulation and Joint Publication 4-01.4, Joint Tactics, Techniques, and Procedures for Joint Theater Distribution. RF Tag data is further transmitted to Global Transportation Network (GTN) and other global asset visibility systems as appropriate. RF tag formats will be identified in the current version of DoD 4500.9-R, Defense Transportation Regulation, and the format requirements will be published in MIL STD 129, DoD Standard Practice for Military Marking for Shipment and Storage. It is the intent of the Department to incorporate all RFID tag formats and usage standards into a DoD RFID manual.

C-7. RFID ITV Server Management. The PM-AIT Office will manage the RFID ITV servers. All Military Services, Combatant Commanders, and DoD Agencies operated RFID interrogators will forward their data to the ITV servers maintained by PM-AIT. This will enable the PM-AIT Office to program for funding and provide a centralized management structure for the regional ITV servers, including the ITV server on the Secret Internet Protocol Router Network (SIPRNET). PM-AIT is responsible for ensuring that ITV system performance and information assurance requirements are in accordance with DODD 8500.1, *Information Assurance (IA),* and DODI 8500.2, *Information Assurance (IA) Implementation*. The Non-classified Internet Protocol Router Network (NIPRNET)-based ITV servers must be interoperable with GTN, GTN 21, Joint Total Asset Visibility, and Integrated Data Environment, and other DoD logistics systems as determined by the PM-AIT Office and the user representative(s). The SIPRNET-based ITV server must interoperate with the Global Combat Support System, Global Command and Control System, and other classified systems as determined by PM-AIT and the User Representative(s). PM-AIT is responsible for maintaining the accreditation and net worthiness certification of all ITV servers.

C-8. Frequency Spectrum Management. DoD components will forward requests for frequency allocation approval via command channels to the cognizant military frequency management office to ensure that RFID tags comply with US national and host-nation spectrum management policies. RFID tags may require electromagnetic compatibility analysis to quantify the mutual effects of RFID devices within all intended operational environments. RFID tags that meet the technical specifications of 47 CFR 15 of the FCC's Rules and Regulations for Non-Licensed Devices, i.e. Part 15, must accept and may not cause electromagnetic interference to any other federal or civil RF device.

(References: International Telecommunications Union (ITU) Radio Regulations (Article 5); National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management; DoD Directive 3222.3, Department of Defense Electromagnetic Compatibility Program, 20 Aug 1990; DoD Directive 4650.1, Policy for Management and Use of the Electromagnetic Spectrum, 8 Jun 04).

APPENDIX D

BUSINESS RULES FOR PASSIVE RFID TECHNOLOGY

D-1. Overview

D-1-1. Passive Radio Frequency Identification (RFID) tags reflect energy from the reader/interrogator or receive and temporarily store a small amount of energy from the reader/interrogator signal in order to generate the tag response. Passive RFID requires strong RF signals from the reader/interrogator, and the RF signal strength returned from the tag is constrained to low levels by the limited energy. This low signal strength equates to a shorter range for passive tags than for active tags.

D-1-2. The DoD Logistics Automatic Identification Technology (LOG-AIT) Office is the DoD focal point for coordinating overarching guidance for the use of AIT within DoD. The Program Executive Office, Enterprise Information Systems (PEO EIS), Product Manager - Automatic Identification Technology (PM-AIT) Office is the DoD procurement activity for AIT equipment (to include RFID equipment and infrastructure) and will establish a standing contract for equipment installation and maintenance. On or after January 1, 2007, only RF-enabled automatic identification technology (AIT) peripherals (e.g. optical scanners, printers used for shipping labels, etc.) will be acquired. On or after January 1, 2007 – logistics automated information systems (AISs) involved in receiving, shipping and inventory management will use RFID to perform business transactions, where appropriate, and AIS funding will hinge on compliance with this policy. The DLB will review these requirements prior to FY 2007 implementation.

D-2. Passive RFID Business Rules. The following prescribes the business rules for the application of passive RFID technology at the case, pallet, and item packaging (unit pack) for Unique Identification (UID) items on shipments to and within DoD. To facilitate the use of RFID events as transactions of record, the DoD has embraced the use of Electronic Product Code (EPC) tag data constructs, as well as DoD tag data constructs, in a supporting DoD data environment. As the available EPC technology matures, the intent is to expand the use of passive RFID applications to encompass individual item tagging.

D-3. Definitions. The following definitions apply to passive RFID technology and tags in support of the DoD requirement to mark/tag materiel shipments to DoD activities in accordance with this policy:

D-3-1. EPC Technology: Passive RFID technology (readers, tags, etc.) that is built to the most current published EPCglobal Class 0 and Class 1 specifications and that meets interoperability test requirements as prescribed by EPCglobal. EPC Technology will include Ultra High Frequency Generation 2 (UHF Gen 2) when this specification is approved and published by EPCglobal.

D-3-2. Unit Pack: A MIL-STD-129 defined unit pack, specifically, the first tie, wrap, or container applied to a single item, or to a group of items, of a single stock number, preserved or

unpreserved, which constitutes a complete or identifiable package, Case (either an exterior container within a palletized unit load or an individual shipping container):

Exterior Container: A MIL-STD-129 defined container, bundle, or assembly that is sufficient by reason of material, design, and construction to protect unit packs and intermediate containers and their contents during shipment and storage. It can be a unit pack or a container with a combination of unit packs or intermediate containers. An exterior container may or may not be used as a shipping container.

Shipping Container: A MIL-STD-129 defined exterior container which meets carrier regulations and is of sufficient strength, by reason of material, design, and construction, to be shipped safely without further packing (e.g., wooden boxes or crates, fiber and metal drums, and corrugated and solid fiberboard boxes).

D-3-3. Pallet (palletized unit load): A MIL-STD-129 defined quantity of items, packed or unpacked, arranged on a pallet in a specified manner and secured, strapped, or fastened on the pallet so that the whole palletized load is handled as a single unit. A palletized or skidded load is not considered to be a shipping container.

D-4. Case, Palletized Unit Load, UID Item Packaging Tagging/ Marking. Case, pallet, and item packaging (unit pack) for Unique Identification (UID) items will be tagged at the point of origin (manufacturer/vendor) with passive RFID tags, except for the bulk commodities listed below. If the unit pack is also the case, only one RFID tag will be attached to the container.

D-4-1. Bulk commodities not included. The following are bulk commodities that are not included in this policy:

Sand

Gravel

Bulk liquids (water, chemicals, or petroleum products) carried or shipped in:

Rail tank cars

Tanker trucks, trailers, or other bulk wheeled conveyances

Pipelines

Ready-mix concrete or similar construction materials

Coal or combustibles such as firewood

Agricultural products – seeds, grains, animal feeds, etc.

D-4-2. DoD sites where materiel is associated into cases or pallets will tag the materiel and supplies at that site with an appropriate passive RFID tag prior to further trans-shipment to follow-on consignees. The Defense Logistics Agency has committed to enabling the strategic distribution centers at Defense Distribution San Joaquin, CA (DDJC) and Defense Distribution

Susquehanna, PA (DDSP) with passive RFID capability by January 1, 2005.

D-4-3. Contract/Solicitation Requirements. Per the schedule outlined in Attachment 3 of this memo, all new solicitations for materiel issued on or after October 1, 2004, for delivery on or after January 1, 2005, will contain a requirement for passive RFID tagging at the case (exterior container within a palletized unit load or shipping container), pallet (palletized unit load), and the UID item packaging level of shipment in accordance with the appropriate interim/final Defense Federal Acquisition Regulation Supplement (DFARS) Rule/Clause.

D-5. Passive UHF RFID Tag Specifications

D-5-1. The DoD approved frequency range for the tags is 860-960 MHz with a read range of three meters. Until the EPC UHF Gen 2 tag specification is published and quantities of UHF Gen 2 items are available for widespread use, the DoD will accept the following EPC tags:

- Class 0 64-bit read-only
- Class 1 64-bit read-write
- Class 1 96-bit read-write

D-5-2. The above listed tags will be utilized for DoD initial implementation projects as well as initial shipments from suppliers in compliance with DFARS contractual requirements to tag items shipped to DoD receiving points commencing January 1, 2005.

D-5-3. When the UHF Gen 2 EPC technology is approved, has completed required compliance or interoperability testing, and is generally available for widespread use in the marketplace, the DoD will establish tag acceptance expiration dates (sunset dates) for EPC Version 1 tags and will accept only UHF Gen 2 EPC tags thereafter.

D-5-4. The DoD goal is to migrate to use of an open standard, UHF Gen 2 EPC tag, Class 1 or higher, that will support DoD end-to-end supply chain integration.

D-5-5. As outlined below, suppliers to DoD must encode an approved tag using either a DoD tag data construct or an EPC draft tag data construct. Suppliers that choose to employ the DoD tag construct will use the Department of Defense Activity Address Code (DODAAC) or CAGE code previously assigned and encode the tags per the rules that follow. Suppliers that choose to use an EPC draft tag data construct will need to join EPCglobal and be assigned a unique EPC manager number that is used in encoding the tags per the rules that follow. …information assurance requirements are in accordance with DODD 8500.1, *Information Assurance (IA),* and DODI 8500.2, *Information Assurance (IA) Implementation*.

D-6. Passive UHF RFID Tag sunset dates for suppliers shipping to DoD:

Class 0 – 64 bit: At a minimum, 2 years from the publication of the specification for UHF Gen 2 – subject to the availability and product maturity of this technology, i.e., UHF Gen 2.

Class 1 – 64 bit: At a minimum, 6 months from the general commercial availability and product maturity of Class 1 96 bit tags.

Class 1 – 96 bit: At a minimum, 2 years from the publication of the specification for UHF Gen 2 – subject to the availability and product maturity of this technology, i.e., UHF Gen 2.

D-7. EDI Data Information

D-7-1. To effectively utilize RFID events to generate transactions of record in DoD logistics systems, RFID tag data with the associated material information must be resident in the DoD data environment so that information systems can access this data at each RFID event (i.e., tag read).

D-7-2. The DoD will require commercial suppliers to provide standard Ship Notice/Manifest Transaction Set (856) transactions in accordance with the Federal Implementation Convention (IC) via Electronic Data Interchange (EDI) for all shipments in accordance with the applicable DFARS Rule via Wide Area Workflow (WAWF). Internal DoD sites/locations and shippers will use the EDI IC 856S or 856A, as applicable.

D-7-3. The transaction sets enable the sender to describe the contents and configuration of a shipment in various levels of detail and provide an ordered flexibility to convey information. The Federal IC 856 and DoD IC 856S and 856A transaction sets will be modified by the appropriate DoD controlling agencies to ensure the transactions can be used to list the contents for each piece of a shipment of goods as well as additional information relating to the shipment such as: order information, product description to include the item count in the shipment piece and item UID information, physical characteristics, type of packaging to include container nesting levels within the shipment, marking to include the shipment piece number and RFID tracking number, carrier information, and configuration of goods within the transportation equipment.

D-7-4. The DoD will also accept the submission of web-based ASN transactions as well as User-Defined-Format (UDF) ASN files. The following required ASN transactions will facilitate this use of RFID events.

D-8. RFID Funding. The cost of implementing and operating RFID technology is considered a normal cost of transportation and logistics and as such should be funded through routine Operations and Maintenance, Working Capital Fund, or Capital Investment processes. It is the responsibility of the DoD activity at which cases, transport packages, or palletized unit loads are built to procure and operate sufficient quantities of passive RFID equipment (interrogators/readers, write stations, tags, etc.) to support required operations. It is the responsibility of the activity at which cases, transport packages, or palletized unit loads are received, (i.e., activity where the "supply" receipt is processed) to procure and operate sufficient quantities of passive RFID equipment (interrogators/readers) to support receiving operations. In those cases where Working Capital Fund activities provide the support, that activity will use Capital Investment or Working Capital Fund cost authority to procure the required RFID equipment as appropriate.

D-9. DoD Purchase Card Transactions. Per current DoD regulations, DoD Purchase Cards may be used to acquire items on existing government contracts as well as acquire items directly from suppliers that are not on a specific government contract. If the DoD Purchase Card is used to acquire items that are on a government contract that includes a requirement for RFID tagging of material per the appropriate DFARS Rule, any items purchased via the DoD Purchase Card shall be RFID tagged in accordance with this policy. For items acquired via an DoD Purchase Card that are not on a government contract that includes a requirement for RFID tagging of material per the appropriate DFARS Rule, this policy does not apply. If DoD customers desire the inclusion of a passive RFID tag on shipments for these type purchases, this requirement must be specifically requested of the shipping supplier/vendor and the shipment must be accompanied by an appropriate ASN containing the shipment information associated to the appropriate RFID tag.

D-10. Frequency Spectrum Management. DoD components will forward requests for frequency allocation approval via command channels to the cognizant military frequency management office to ensure that RFID tags comply with US national and host-nation spectrum management policies. RFID tags may require electromagnetic compatibility analysis to quantify the mutual effects of RFID devices within all intended operational environments. RFID tags that meet the technical specifications of 47 CFR 15 of the FCC's Rules and Regulations for Non-Licensed Devices, i.e. Part 15, must accept and may not cause electromagnetic interference to any other federal or civil RF device. (References: International Telecommunications Union (ITU) Radio Regulations (Article 5); National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management; DoD Directive 3222.3, Department of Defense Electromagnetic

APPENDIX E

ACTIVE RFID TAG DATA ELEMENT FORMAT

E-1. RFID Tag Format

The data rich active RFID tag has three parts; license plate (read only), content detail, and free text. The license plate portion contains tag ID and is used by the architecture to read and report location of the RFID tag as it moves through the distribution system. Content detail can be queried for specific information about content within the container or on the pallet using a handheld device. Queries through the web to the RFID server see content data on the server relative to the RFID Tag ID number.

E-2. Content Level Detail

Content Level Detail includes those data elements that describe the asset (described separately under Asset Level Detail below) plus the data elements necessary to minimally identify each level of a complete shipment entity (a single shipment unit or a consolidated shipment). The most basic entity is a single box or unpacked item governed by a shipment unit identifier. The following required data elements represent the minimum necessary to provide Content Level Detail visibility for each shipment unit and are contained in the requisition documents, the Transportation Control and Movement Document (TCMD), the commercial carrier transactions, and the Consolidated Shipment Information transactions that describe the shipment and shipment movement characteristics:

Requisition Document Number,
Required Delivery Date (RDD) or expedited shipment and handling codes,
Project Code,
Asset (item) Quantity,
Unit of Issue (U/I),
'From' Routing Indicator Code (RIC) (for DOD shipments),
Inventory Control Point (ICP) RIC (for contractor/vendor shipments),
Shipment Transportation Control Number (TCN) – for single shipment unit,
Intermediate TCN – for a multi-level consolidated shipment,
Conveyance (lead) TCN – for a consolidated shipment,
Commercial Carrier Shipment Tracking Identifier,
Transportation Priority,
Sender (Consignor) DODAAC/CAGE Code,
Ship Date,
Point of Embarkation (POE) Code,
Point of Debarkation (POD) Code,
Shipment Total Pieces,
Shipment Total Weight,
Shipment Total Cube,
Oversize Length/Width/Height,
Receiver (Consignee) DODAAC,
Commodity Class,
Commodity Code (air/water),
Special Handling Code (air/water),
Water Type Cargo Code,
Net Explosive Weight (NEW),
Unit Identification Code (UIC),
Unit Line Number (ULN),
Operation/Exercise Name,
Hazardous Material (HAZMAT) Shipping Characteristics: United Nations Identification Number (UN ID), Class or Division Number, Package Group, Compatibility Group.

E-3. Asset level detail

This is the fundamental information necessary to describe an item and a mandatory requirement in obtaining visibility. The following data elements are the minimum required to describe the physical and identification characteristics of a single asset:

National Stock Number (NSN),
Nomenclature/Description Model Number,
Unit Price (U/P),
Condition Code,
Serial Number / Bumper Number,
Serial Number Enterprise Identifier (if UID eligible),
Part Number (if UID eligible, as applicable),
Item Weight,
Item Cube,
Line Item Number (LIN)/Package Identification (PKGID),
Ammunition Lot Number,
Department of Defense Identification Code (DODIC),
Hazardous Cargo Descriptor Codes (to include ammo/ hazardous materiel).

APPENDIX F

GLOSSARY

Active tag: An RFID tag that comes with a battery that is used to power the microchip's circuitry and transmit a signal to a reader. Active tags can be read from 100 feet or more away, but they're expensive – typically more than $20 each. They're used for tracking expensive items over long ranges. For instance, the US military uses active tags to track containers of supplies arriving in ports.

Antenna: The antenna is the conductive element that enables RFID tags to send and receive data. Passive tags usually have a coiled antenna that couples with the coiled antenna of the reader to form a magnetic field. The tag draws power from this field.

Anti-collision: A general term used to cover methods of preventing radio waves from one device from interfering with radio waves from another. Anti-collision algorithms are also used to read more than one tag in the same reader's field.

Asset visibility. The capability to collect, maintain, and display information on the identity, status, location and predicted movement of specific items in the global distribution system. It includes the capability to track requisitions, assets in storage, assets in process, assets in transit, and assets in theater.

Austere Environment. Any location completely void of means or media for communications, power, transportation, and other infrastructure. In this environment the ability to operate is totally dependent on the capabilities deployed with the expeditionary forces.

Automated information system (AIS). The hardware and software used to track and process unit and non-unit equipment/cargo, passengers, medical patients, materiel, and personal property from point of origin to final destination. AIS's serve to store, transmit, receive and display data, providing users with asset visibility. AIS's provide a context, form and vehicle for the transfer and display of data that facilitates the movement of forces for command and control operations.

Automatic Identification Technology (AIT). A suite of technologies that enables the automated capture of source data for electronic transmission to and from AIS's, thereby enhancing the ability to identify, track, document and control deploying forces, equipment, personnel, and cargo. It includes but is not limited to bar codes, radio frequency identification, magnetic stripes, common access or "smart" cards, optical memory cards, touch buttons and satellite tracking devices. Within DOD logistics, these technologies facilitate the capture of supply, maintenance, and transportation information for inventory and movement management, shipment diversion and reconstitution, and personnel or patient identification.

Automatic Identification and Data Capture (AIDC): AIT tools and devices used to collect data and automatically enter it into computer systems with minimum or without human intervention. Technologies normally considered part of AIDC include bar codes, biometrics,

RFID, and voice over recognition.

Back scatter: A method of communication between tags and readers. RFID tags using back-scatter technology reflect back to the reader a portion of the radio waves that reach them. The reflected signal is modulated to transmit data. Tags using back scatter technology can be either passive or active, but either way, they are more expensive than tags that use inductive coupling.

Barcode: A standard method of identifying the manufacturer and product category of a particular item. The barcode was adopted in the 1970s because the bars were easier for machines to read than optical characters. Barcodes' main drawbacks are they don't identify unique items and scanners must have line of sight to read them.

Chipless RFID tag: An RFID tag that doesn't depend on an integrate microchip. Instead, the tag uses materials that reflect back a portion of the radio waves beamed at them. A computer takes a snapshot of the waves beamed back and uses it like a fingerprint to identify the object with the tag. Companies are experimenting with embedding RF reflecting fibers in paper to prevent unauthorized photocopying of certain documents. But chipless tags are not useful in the supply chain, because even though they are inexpensive, they can't communicate a unique serial number that can be stored in a database.

Closed-loop systems: RFID tracking systems set up within an organization. Since the tracked item never leaves that organization's control, it does not need to worry about using technology based on open standards.

Contact Memory Button (CMB): AIT device that contains a memory chip and housed in a hardened shell that can be attached directly to static and dynamic components. The memory of the chips ranges typically from 4Kb to as much as 128Kb. CMBs are used for providing on-board memory storage for historical records and documentation related to a component or piece of equipment and are usually integrated into maintenance business processes. The CMB is read using a specially equipped handheld touch reader. CMBs are also referred to as 'touch buttons.'

Data Rich Active RFID Tag: Active RFID Tag with integrated on-board storage capacity that can be remotely accessed and queried. Typical on-board memory can range from 128Kb to 256Kb or more. Data rich active tags are also referred to as 'high capacity' active RFID tags.

Defense Logistics Management System (DLMS): The DLMS is a process governing logistics functional business management standards and practices rather than an automated information system. The DLMS interprets, prescribes, and implements DoD policy in the functional areas of supply, transportation, acquisition (contract administration), maintenance, and finance. Joint committees administer the requirements of these functional areas. ***Where it will have the greatest impact on Marine Corps Logistics*** will be in the switch from "mils" transactions (80 card-column) to Executable Mark-up Language (XML). DLMS transactions are variable lengths, which all for the EPC RFID number to be embedded such as the 856S transaction (ASN).

Deployable capability: An AIT/AIS capability for use in temporary and/or remote/austere

locations, or any location not permanently configured to accept and operate a range of AIT media (Logistics functions). Deploying units can receive the benefits of AIT and corresponding interfaces with AIS's through the use of the deployable capability. They can provide in-theater transportation, logistic, supply, and command and control capabilities while assisting in providing ITV to units during the early stages of conflicts, contingencies, or other designated operations.

Duty Cycle: The combination of schedule and duration upon which an RF reader or interrogator automatically activates to collect tag reads within range. Frequency and duty cycle are critical components in the operating certification of RF reader devices within a given country.

Electronic data interchange (EDI). A commercial term referring to the transfer of data between different organizations using networks, such as the Internet. As more and more organizations get connected to the Internet, EDI is becoming increasingly important as an easy mechanism for organizations to move information electronically. A large percentage of DoD cargo moves via commercial means and DoD is beginning to require these carriers to provide ITV information via EDI. The dominant set of standards for EDI are the X12 standards adopted by the American National Standards Institute (ANSI). DoD EDI Implementation Conventions are used to adapt the ANSI X12 standards for DoD implementation.

Executive agent (EA). A term used in DoD and Service regulations to indicate a delegation of authority by a superior to a subordinate to act on behalf of the superior. Designation as EA, in and of itself, confers no authority. The exact nature and scope of the authority delegated must be stated in the document designating the EA. An EA may be limited to providing only administration and support or coordinating common functions, or it may be delegated authority, direction, and control over specified resources for specified purposes.

Electromagnetic compatibility (EMC): The ability of a system or product to function properly in environment where other electromagnetic devices are used and not be a source itself of electromagnetic interference.

Electromagnetic interference (EMI): Interference caused when the radio waves of one device distort the waves of another. Cells phones, wireless computers and metal framing in warehouses can produce radio waves that interfere with RFID tags.

Electronic article surveillance (EAS): Simple electronic tags that can be turned on or off. When an item is purchased (or borrowed from a library), the tag is turned off. When someone passes a gate area holding an item with a tag that hasn't been turned off, an alarm sounds. EAS tags are embedded in the packaging of most pharmaceuticals.

Electronic Product Code: (EPC): A standard 96-bit code, created by the maintained by EPC Global, that may one day largely replace Uniform Product Code (UPC) barcodes. The EPC has digits to identify the manufacturer, product category and the individual item. EPC is supported by the Uniform Code Council and EAN International, the two main bodies that oversee barcode standards.

Freight Agent: A commercial activity under contract to the Marine Corps. The freight agent performs DLR receipt and consolidation at nodes and is responsible for forwarding material via traceable transportation to the hubs.

Frequency: The number of repetitions of a complete wave within one second. 1 Hz equals one complete waveform in one second. 1khz equals 1,000 waves in a second. RFID tags use low, high, ultra-high, and microwave frequencies. Each frequency has advantages and disadvantages that make them more suitable for some applications than for others.

High-frequency tags: They typically operate at 13.56 mhz. They can be read from about 10 feet away and transmit data faster than low-frequency tags. They consume more power than low-frequency tags, however.

Inductive coupling: A method of transmitting data between tags and readers in which the antenna from the reader picks up changes in the tag's antenna.

Integrated circuit (IC): A microelectronic semiconductor device comprising many interconnected transistors and other components. Most RFID tags have ics.

Integrated priority list (IPL). A list of a combatant commander's highest priority requirements, prioritized across Service and functional lines, defining shortfalls in key programs that, in the judgment of the combatant commander, adversely affect the capability of the combatant commander's forces to accomplish their assigned mission. The IPL provides the combatant commander's recommendations for programming funds in the Planning, Programming, and Budgeting System process.

In-transit visibility (ITV). The ability to track the identity, status, and location of DoD units, non-unit cargo (excluding bulk petroleum, oils and lubricants) and passengers; medical patients; and personal property from origin to consignee or destinations across the range of military operations during peace, contingencies and war. ITV is that portion of Total Asset Visibility (TAV) that focuses on assets in the transportation pipeline. USTRANSCOM is the designated DoD focal point for ITV.

ITV Server. The server network supporting the RF in-transit visibility architecture. Also referred to as the RF ITV server. The server automatically collects feeds from the RF interrogators based on the established reporting interval and duty cycle, and displays the result in a web-enabled software application.

Low-frequency tags: Typically operate at 125 khz. The main disadvantages of low-frequency tags are they have to be read from within three feet and the rate of data transfer is slow. But they are less expensive and less subject to interference than high- frequency tags.

Machine Readable Identification. Direct part making using AIT media.

Memory: The amount of data that can be stored on a tag or chip.

Microwave tags: Radio frequency tags that operate at 5.8 ghz. They have very high transfer rates and can be read from as far as 30 feet away, but they use a lot of power and are expensive.

Nominal range: The read range at which the tag can be read reliably.

Null spot: Area in the reader field that doesn't receive radio waves. This is essentially the reader's blind spot. It is a phenomenon common to UHF systems.

Object Name Service (ONS): An EPCglobal system for looking up unique Electronic Product Codes and pointing computers to information about the item associated with the code. ONS is similar to the Domain Name Service, which points computers to sites on the Internet.

Passive tag: An RFID tag without its own power source and transmitter. When radio waves from the reader reach the chip's antenna, it creates a magnetic field. The tag draws power from the field and is able to send back information stored on the chip. Today, simple passive tags cost around 50 cents to several dollars. When radio waves from the reader reach the chip's antenna, the energy is converted by the antenna into electricity that can power up the microchip in the tag. The tag is able to send back information stored on the chip. Today, simple passive tags cost from U.S. 20 cents to several dollars, depending on the amount of memory on the tag, packaging and other features.

Power level: The amount of RF energy radiated from a reader or an active tag. The higher the power output, the longer the read range, but most governments regulate power levels to avoid interference with other devices.

Radio Frequency Identification (RFID): A method of identifying unique items using radio waves. Typically, a reader communicates with a tag, which holds digital information in a microchip. But there are chipless forms of RFID tags that use material to reflect back a portion of the radio waves beamed at them.

Read: The process of turning radio waves from a tag into bits of information that can be used by computer systems.

Read rate: The maximum rate at which data can be read from a tag expressed in bits or bytes per second.

Reader (also called an interrogator): The reader communicates with the RFID tag via radio waves and passes the information in digital form to a computer system.

Reader field: The area of coverage. Tags outside the reader field do not receive radio waves and can't be read.

Read-only tags: Tags that contain data that cannot be changed unless the microchip is reprogrammed electronically.

Read range: The distance from which a reader can communicate with a tag. Active tags have a

longer read range than passive tags because they use a battery to transmit signals to the reader, whereas passive tags use reflected energy. With passive tags, the read range is influenced by frequency, reader output power, antenna design, and method of powering up the tag. Low frequency tags use inductive coupling (see above), which requires the tag to be within a few feet of the reader.

Read-write tags: RFID tags that can store new information on its microchip. These tags are often used on reusable containers and other assets. When the contents of the container are changed, new information is written to the tag. Read-write tags are more expensive than read only tags, and therefore are of limited use for supply chain tracking.

RFID tag: A microchip attached to an antenna that is packaged in a way that it can be applied to an object. The tag picks up signals from and sends signals to a reader. The tag contains a unique serial number, but may have other information, such as a customers' account number. Tags come in many forms, such smart labels that can have a barcode printed on it, or the tag can simply be mounted inside a carton or embedded in plastic. RFID tags can be active, passive or semi-passive

Service Component Commands. A command consisting of the Service component commander and all those Service forces, such as individuals, units, detachments, organizations, and installations under the command, include the support forces that have been assigned to a combatant command, or further assigned to a subordinate unified command or joint task force.

Scanner: An electronic device that can send and receive radio waves. When combined with a digital signal processor that turns the waves into bits of information, the scanner is called a reader or interrogator.

Semi-passive tag: Similar to active tags, but the battery is used to run the microchip's circuitry but not to broadcast a signal to the reader. Some semi-passive tags sleep until they are woken up by a signal from the reader, which conserves battery life. Semi-passive tags can cost a dollar or more. These tags are sometimes called battery-assisted tags.

Sensor: A device that responds to a physical stimulus and produces an electronic signal. Sensors are increasingly being combined with RFID tags to detect the presence of a stimulus at an identifiable location.

Shipping unit. One or more items of compatible commodities or items assembled into one unit that becomes the basic entity for control throughout the transportation cycle.

Silent Commerce: This term covers all business solutions enabled by tagging, tracking, sensing and other technologies, including RFID, which make everyday objects intelligent and interactive. When combined with continuous and pervasive Internet connectivity, they form a new infrastructure that enables companies to collect data and deliver services without human interaction.

Smart label: A label that contains an RFID tag. It's considered "smart" because it can store information, such as a unique serial number, and communicate with a reader.

Total asset visibility (TAV). The capability to provide users with timely and accurate information on the location, movement, status, and identity of units, personnel, equipment, and supplies. It also includes the capability to act upon this information to improve overall performance of logistics practices. The JTAV program is designed to provide the joint infrastructure necessary for tracking assets in process, in-storage, and in-transit. This allows both operational and logistics managers to obtain and act on information on the location, quantity, condition, movement, and status of assets throughout DoD's logistics systems.

Tracing. The characteristic of a functional capability to know the planned or expected route that material or assets will travel if not otherwise precluded by error. Tracing is most clearly associated with documentation such as those used for transportation control, bills of lading and shipping documentation. The function of tracing can be manual or automated.

Tracking. The physical characteristic of a functional capability to positively know where materiel or assets are, or should be, based on actual time specific data collected. Tracking can be measured in either real-time, near real-time, or combination of both and can be manual or automated.

Ultra-high frequency (UHF): Typically, tags that operate between 866 mhz to 930 mhz. They can send information faster and farther than high and low frequency tags. In spite of this capability, the radio waves do not pass through items with high water content, such as fruit, at these frequencies. UHF tags are also more expensive than low-frequency tags, and require greater more power levels.

Uniform Code Council (UCC): The nonprofit organization that overseas the Uniform Product Code, the barcode standard used in North America.

Uniform Product Code (UPC): The barcode standard used in North America. It is administered by the Uniform Code Council.

Visibility System. Any automated information system or automated environment used to collect, maintain, and display information on the identity, status, location and predicted movement of specific items in the global distribution system; including the capability to track or trace requisitions, assets in storage, assets in process, assets in transit, and assets in theater.

Write rate: The rate at which information is transferred to a tag, written into the tag's memory and verified as being correct.

APPENDIX G

POA&M For Passive RFID Pilots and Implementation

Action	Lead Organization	Supporting Organization	Start Date	Comp Date
Request funding to support Passive RFID pilots and implementation in during POM 08	SYSCOM	HQMC, (LPD)	Sep 2005	Feb 2006
Write Pilot Plan for LogCom Pilot – include funding, organizations impacted, resources, milestones for equipment installation, test and integration. Establish goals/metrics and coordination requirements with other agencies, etc.	LOGCOM	SYSCOM, HQMC (LPC, LPD, LPV)	Jan 2007	Mar 2007
LogCom Pilot	LOGCOM	SYSCOM HQMC (LPC, LPD, LPV)	Oct 2007	Sep 2008
Write Plan for SMU Pilot – include funding, organizations impacted, resources, milestones for equipment installation, test and integration. Establish goals/metrics and coordination requirements with other agencies, etc.	HQMC (LPC) for process issues HQMC (LPD) for technical issues	SYSCOM, MARFORS HQMC (LPV)	Jan 2008	Mar 2008
Write final report detailing results of LogCom pilot	HQMC (LPC - LMTs)	MARFORS SYSCOM HQMC (LPV) HQMC (LPD)		Dec 2008
Gain Milestone Decision regarding LOGCOM RFID Roll-out	LOGCOM	HQMC (LPC, LPD) SYSCOM		Dec 2008
Rollout of RFID at LogCom (Albany and Barstow)	SYSCOM	LOGCOM HQMC (LPC,LPD)		Dec 2008
SMU Pilot	HQMC (LPC) for process issues HQMC (LPD) for technical issues	SYSCOM MARFORS	Oct 2008	Sep 2009

Action	Lead Organization	Supporting Organization	Start Date	Comp Date
Write / Develop detailed roll-out plan of Passive RFID for **CONUS** SMUs	SYSCOM	HQMC (LPD, LPC) MARFORS	Jun 2009	Aug 2009
Write Pilot Plan for TMO Pilot - include funding, organizations, resources, milestones, goals, metrics, coordination requirements with other agencies, etc.	HQMC (LPD)	SYSCOM MCB	Jun 2009	Aug 2009
Write / Develop detailed roll-out of Passive RFID for **OCONUS** SMU	SYSCOM	HQMC (LPD, LPC), MARFORS	Jul 2009	Nov 2009
TMO Pilot	SYSCOM	SYSCOM MARFORS HQMC (LPC, LPD)	Oct 2009	Sep 2010
Write final report detailing results of SMU pilot	HQMC (LPC – LMTs)	SYSCOM MARFORS HQMC (LPD)		Dec 2009
Gain Milestone Decision regarding RFID Roll-out for SMUs	MARFORs	HQMC (LPD, LPC) SYSCOM		Dec 2009
Rollout of Passive RFID equipment to CONUS SMUs and CSSDs (Hawaii, 29 Palms)	SYSCOM	MARFORs HQMC (LPC, LPV)	Jan 2010	Jul 2010
Write / Develop detailed roll-out plan of Passive RFID for CONUS TMOs	SYSCOM	HQMC (LPD, LPC) MCB	Jun 2010	Aug 2010
Write Pilot Plan for SMU Deployed Operations Pilot - include funding, organizations, resources, milestones, goals, metrics, coordination requirements with other agencies, etc.	HQMC (LPC) for process issues HQMC (LPD) for technical issues	SYSCOM MCB	Jun 2009	Aug 2009
SMU Deployed Operations Pilot	HQMC (LPC) for process issues HQMC (LPD) for technical issues	SYSCOM MARFORS	Oct 2010	Sep 2011

Action	Lead Organization	Supporting Organization	Start Date	Comp Date
Write final report detailing results of TMO pilot	HQMC (LPD – LMTs)	SYSCOM MARFORS		Dec 2010
Gain Milestone Decision regarding moving to RFID Roll-out for TMOs	MARFOR / MCB	HQMC (LPD, LPC) SYSCOM		Dec 2010
Rollout of Passive RFID to TMOs	SYSCOM	HQMC (LPC, LPD) MCB	Jan 2011	Jul 2011
Write final report detailing results of SMU Deployed Operations Pilot	HQMC (LPC – LMTs)	SYSCOM MARFORS HQMC (LPD)		Dec 2011
Gain Milestone Decision regarding RFID Roll-out for Deployed Operations RFID capability	MARFORs	HQMC (LPD, LPC) SYSCOM		Dec 2011
Rollout of Passive RFID to SMUs supporting deployed operations	SYSCOM	HQMC (LPC, LPD) MCB	Jan 2012	Jul 2012

APPENDIX H
Financial Requirements for Passive RFID

	Qty	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
					Refresh of 08 Equip		
LogCom Pilot							
Interrogators	6	**$27,543**			$30,097		
Tag	1	**$1,093**			$1,194		
Printers	4	**$18,187**			$19,874		
Hand-held devices	8	**$62,067**			$67,822		
Integration to local systems		**$300,000**					
Subtotal:		**$408,890**			$118,987		
						Refresh of '09 Equipment	
LogCom Roll-Out							
Interrogators	6		**$28,370**			$31,000	
Tag	1		**$1,126**	**$1,159**	**$1,194**	$1,230	
Printers	4		**$18,733**			$20,470	
Hand-held devices	8		**$63,929**			$69,857	
Subtotal:			**$112,157**			**$122,557**	
SMU (Pilot - CONUS)							
Interrogators	6		$28,370			$31,000	
Tag	1		$1,126	$1,159	$1,194	$1,230	$1,267
Printers	4		$18,733			$20,470	
Hand-held devices	8		$63,929			$69,857	
Integration to GCSS			$300,000				
Total:			$412,157			$122,557	
							Refresh of 10 Equipment
SMU Roll-out (CONUS)							
Interrogators	6			$29,221			$31,930
Tag	1			$1,159	$1,194	$1,230	$1,267
Printers	4			$19,295			$21,084
Hand-held devices	8			$65,847			$71,953

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Financial Requirements for Passive RFID

	Qty	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Contract Support				$150,000			
SMU Subtotal (Same as in 2008)				$265,522			$126,234
SMU (OCONUS) Roll-out							
Interrogators	3			$14,610			$15,965
Tag	1			$1,159			$1,267
Printers	2			$9,647			$10,542
Hand-held devices	4			$32,923			$35,976
Contract Support				$150,000			
Subtotal				$208,340			$63,750
Hawaii & 29 Palms CSSDs							
Interrogators	6	(3 ea)		$29,221			$31,930
Tag	2	(1 ea)		$2,319	$2,388	$2,460	$2,534
Printers	4	(2 ea)		$19,295			$21,084
Hand-held devices	6	(3 ea)		$49,385			$53,964
Subtotal				$100,219			$109,512
TMO Pilot (CONUS)							
Interrogators	4			$19,480			$21,287
Tag	1			$1,159			$1,267
Printers	2			$9,647			$10,542
Hand-held devices	6			$49,385			$53,964
Systems Integration	1			$562,754			
Subtotal				$642,427			$87,060
TMO Roll-out (CONUS)							
Interrogators	4				$20,065		
Tag	1				$1,194		
Printers	2				$9,937		

APPENDIX H
Financial Requirements for Passive RFID

	Qty	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Hand-held devices	6				$50,867		
Contract Support					$150,000		
Subtotal					$232,062		
TMO Roll-out OCONUS, Hawaii, 29 Palms							
Interrogators	9	(3 ea)			$45,146		
Tag	3	(1 ea)			$3,582		
Printers	6	(2 ea)			$29,811		
Hand-held devices	9	(3 ea)			$76,300		
Contract Support					$50,000		
Subtotal					$204,839		
MDC - Deployed Operations Pilot							
Portable Interrogators	8				$40,130		
Tag	4				$4,776		
Printers	6				$29,811		
Hand-held devices	16				$135,644		
Integration Services	1				$250,000		
Subtotal					$460,361		
MDC - Deployed Operations Roll-out							
Portable Interrogators	16	(8 ea)				$82,667	
Tag	6	(3 ea)				$7,379	
Printers	12	(6 ea)				$61,410	
Hand-held devices	20	(10 ea)				$174,642	
Contract Support						$150,000	
Subtotal						$476,099	
MEUs/MSSGs							

APPENDIX H
Financial Requirements for Passive RFID

	Qty	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Hand-held devices	28					$244,499	
Tag Refresh	7				$8,358		
Tag Refresh	9					$10,746	
Tag Refresh	6						$7,379
Other Direct Costs		$275,000	$425,000	$300,000	$600,000	$600,000	$600,000
Grand Total		**$683,890**	**$949,314**	**$1,518,827**	**$1,630,578**	**$1,580,147**	**$995,202**